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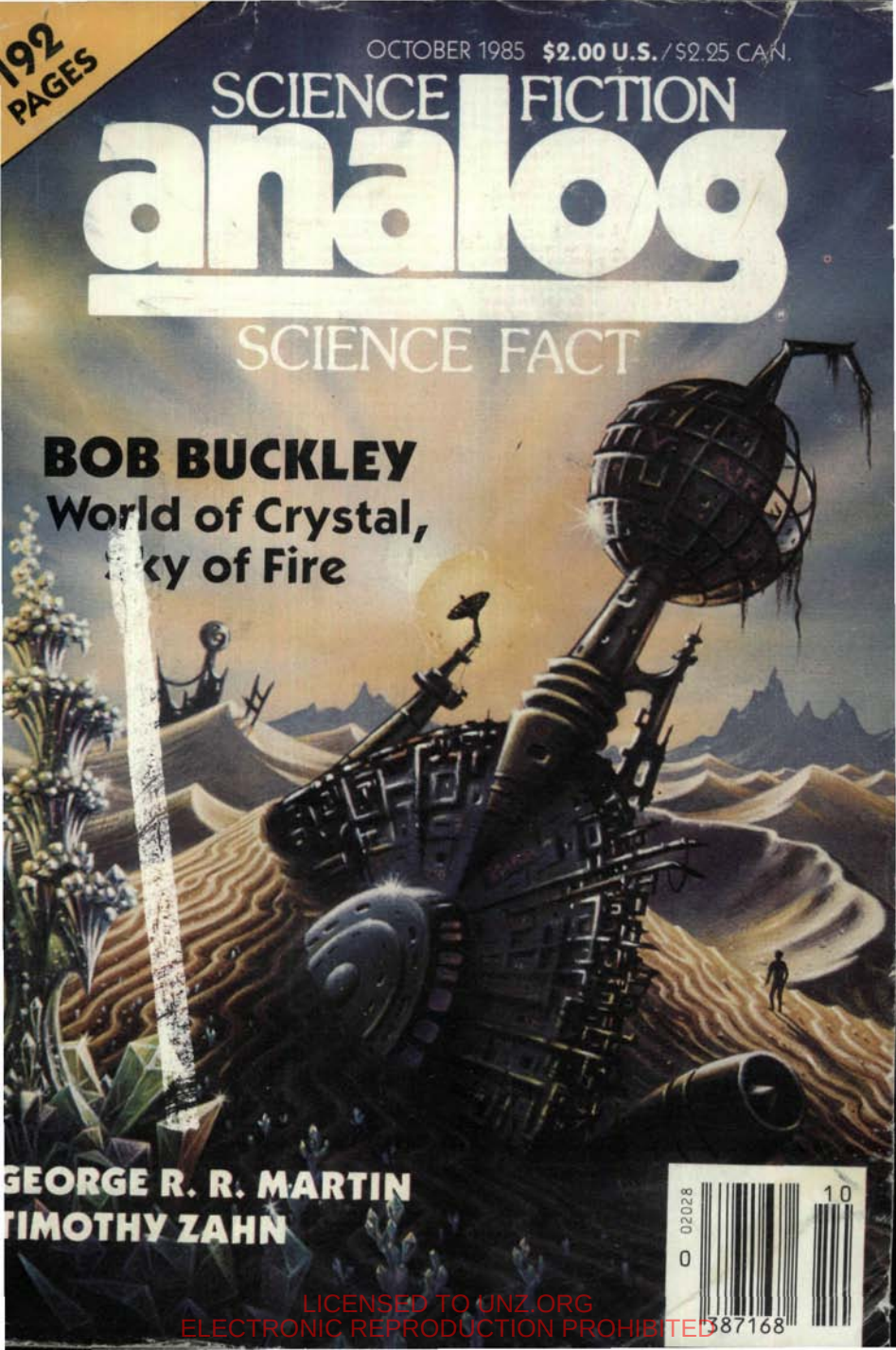

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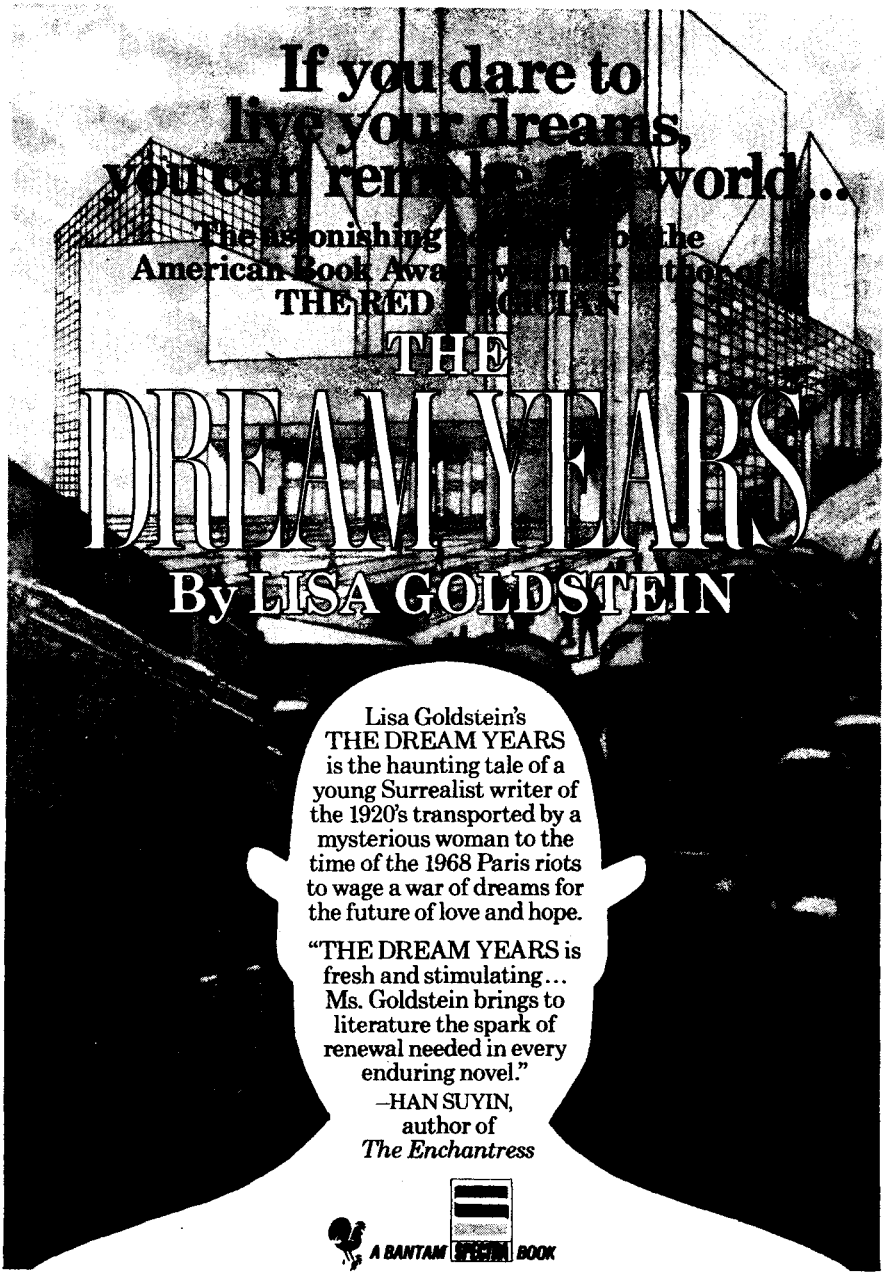
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Editorial

MORE THAN ONE WAY...

Stanley Schmidt

The first astronomy book I can remember reading contained two pages on the origin of the Solar System, admitting that nobody really knew how it happened but outlining two general types of theories which had been proposed. One was the old Kant-Laplace "nebular hypothesis," in which the Sun was formed by the gravitational contraction of a mass of gas. Because of the conservation of angular momentum, the mass would tend to spin faster as its volume shrank, and if it sped up enough it might fling equatorial matter off into space, there to coalesce into planets. The other model in my old book was the Chamberlin-Moulton theory, in which the material for planets was pulled from the Sun by the tidal attraction of another star passing nearby. The book freely admitted that both theories, in the forms they had then, failed to explain a good deal that needed explaining.

However, most subsequent models are recognizable descendants of one or the other of these. The question of which way it actually happened has long been a subject of more than local interest because of the implications the answer might have for the abundance of "solar" systems—and the things that might inhabit them. If what happened here was some version of the Kant-Laplace model, planet formation would seem to be a normal part of star formation, and the universe would teem with planets and life. But if it took an event as special

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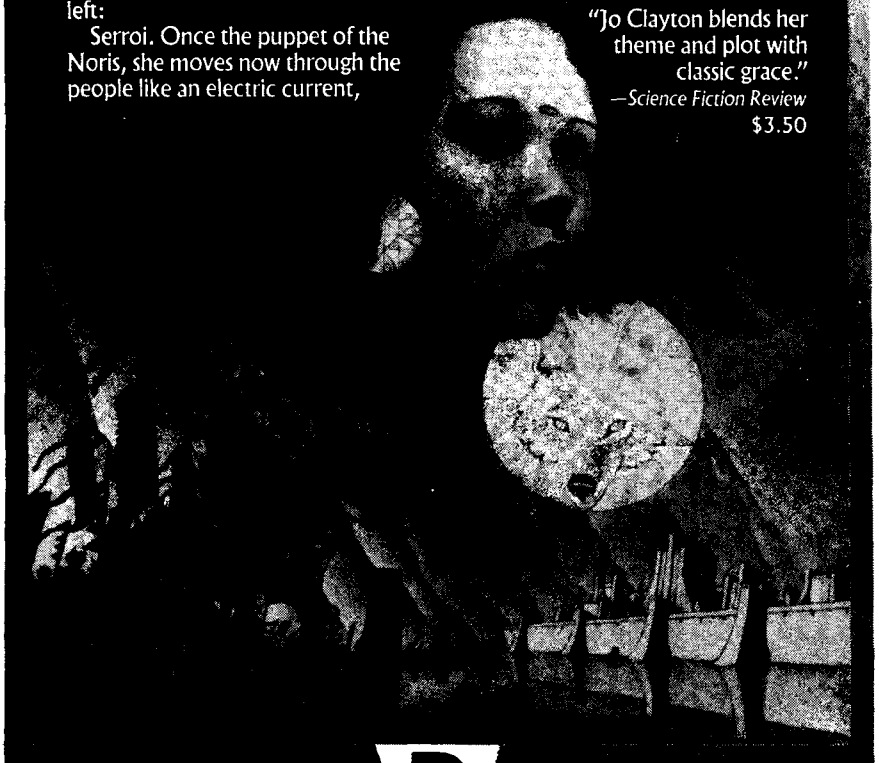

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and improbable as a close encounter between two stars in the near emptiness of space, that could not be expected to happen often. If the Chamberlin-Moulton theory was the better approximation to history, we might well be alone, or very close to it.

The intervening decades have turned up a variety of observational evidence suggesting that many other stars do have planets, which in turn suggests that something like the Kant-Laplace nebular process does in fact occur as a more or less normal part of stellar evolution. The models currently in vogue have a lot of features neither Kant nor Laplace ever dreamed of, like magnetic coupling to transfer excess angular momentum to protoplanets and shock wave effects from relatively nearby supernovas, but the essence of the picture is still the creation of planets from pieces cast off by spinning, contracting protostars. True, the shock wave involves some help from another star, but that doesn't require such an improbable encounter as the old Chamberlin-Moulton theory. So we can now view our planets as a normal by-product of the Sun's formation, expect to find many similar sets around other stars, and forget about processes involving such wildly unlikely scenarios as near collisions between stars.

Or can we?

Let me leave that question hanging momentarily while I look at another case with certain parallels to this one. I recently read a review of our anthology, *Aliens from Analog*, so delightfully favorable that I could hardly complain about anything in it. But I ask you to ponder one point the reviewer makes in connection with Marc Stiegler's "Petals of Rose," a story involving a species of aliens who, among other things, pass information from generation to generation by ingesting "brain-blood" of their immediate ancestors. The reviewer quite reasonably surmises that this concept was based on the widely publicized experiments in which planarians (flatworms) appeared to learn mazes more quickly after eating others of their own kind which had already done so. Pointing out that those experiments have fallen into some disrepute, he says, "Another brilliant idea bites the dust," and then goes on to find enough other virtues in Stiegler's story to overcome the shakiness of the idea.

Which is all very nice, but I can't resist asking: is the idea really all that shaky, anyway? Even if you accept that the planarian "chemical learning" results are truly discredited and wrong, rather than merely controversial, *the story was not about terrestrial flatworms*. If life has developed independently on other planets, it's entirely possible that it has developed a somewhat different bag of tricks on each of them. The fact that no organism currently living on Earth uses a particular mechanism (such as chemical learning) in no way precludes the possibility that at least one somewhere else *has* learned to use it. It does seem to be true that the same physical principles apply everywhere, but there are a lot of ways to apply those principles. It doesn't necessarily follow that all possible appli-

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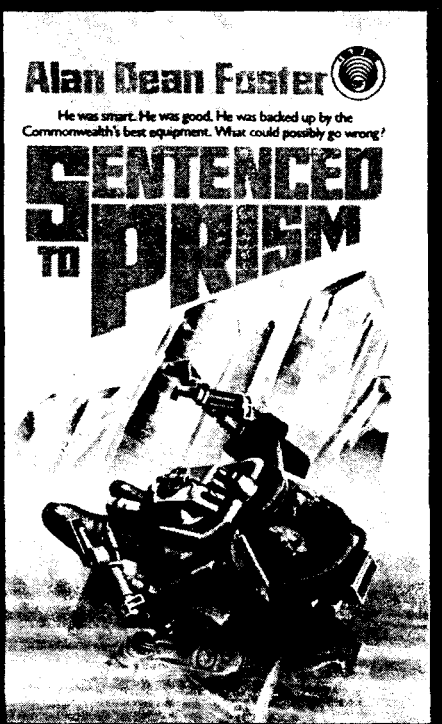
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cations will be used on every world. (Local example: No known macroscopic animal on Earth has wheels, though the wheel is well established as a good way of moving large masses over suitable terrain.) What mechanisms evolve in a given time and place must depend on what materials are available to work with as the result of previous evolution, as well as what a new organism has to compete against. It seems reasonable to suppose that most viable mechanisms will evolve in many places, but assuming that *every* one will exist in *every* place seems too much. Some adaptations may turn out to be quite rare in the universe at large—and there may include not only exotic surprises awaiting our discovery when we visit distant stars, but perhaps also some that we take for granted as "common" here on Earth. (Remember Lloyd Biggle's tale about inhabitants of a world without ears or sonic communication?)

Exobiologists have often invoked an "assumption of mediocrity": the assumption that there's nothing particu-

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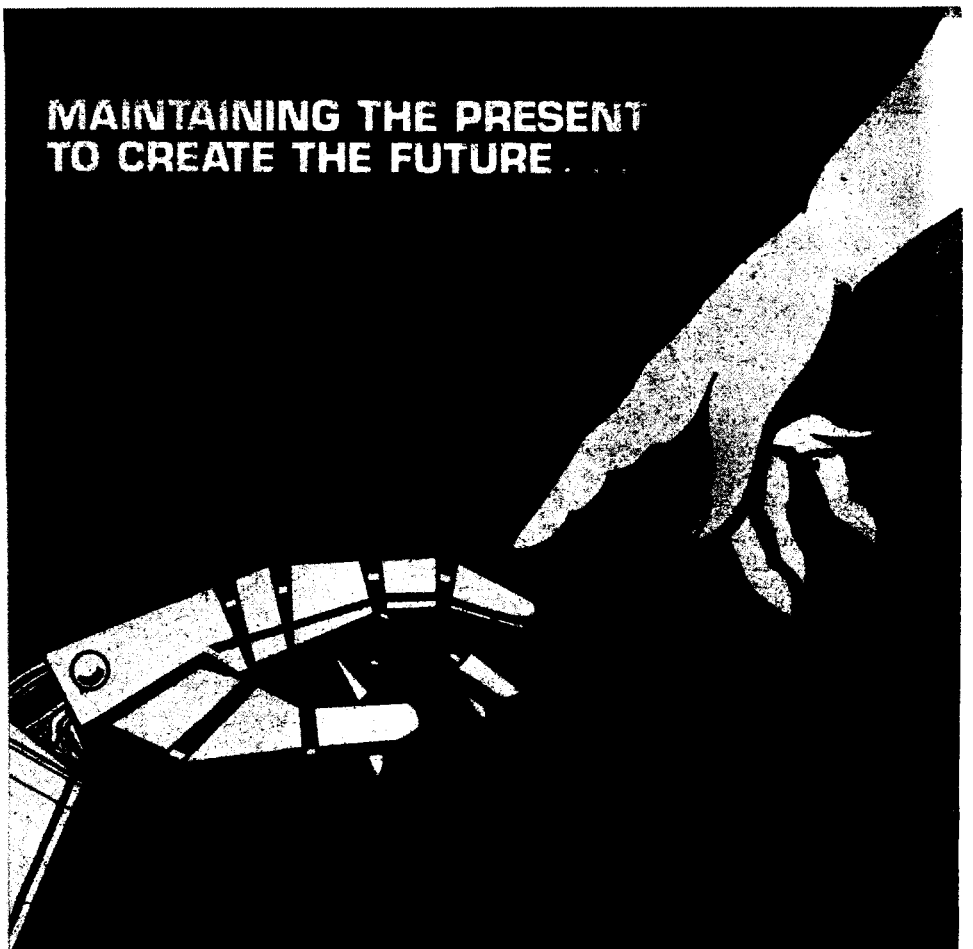

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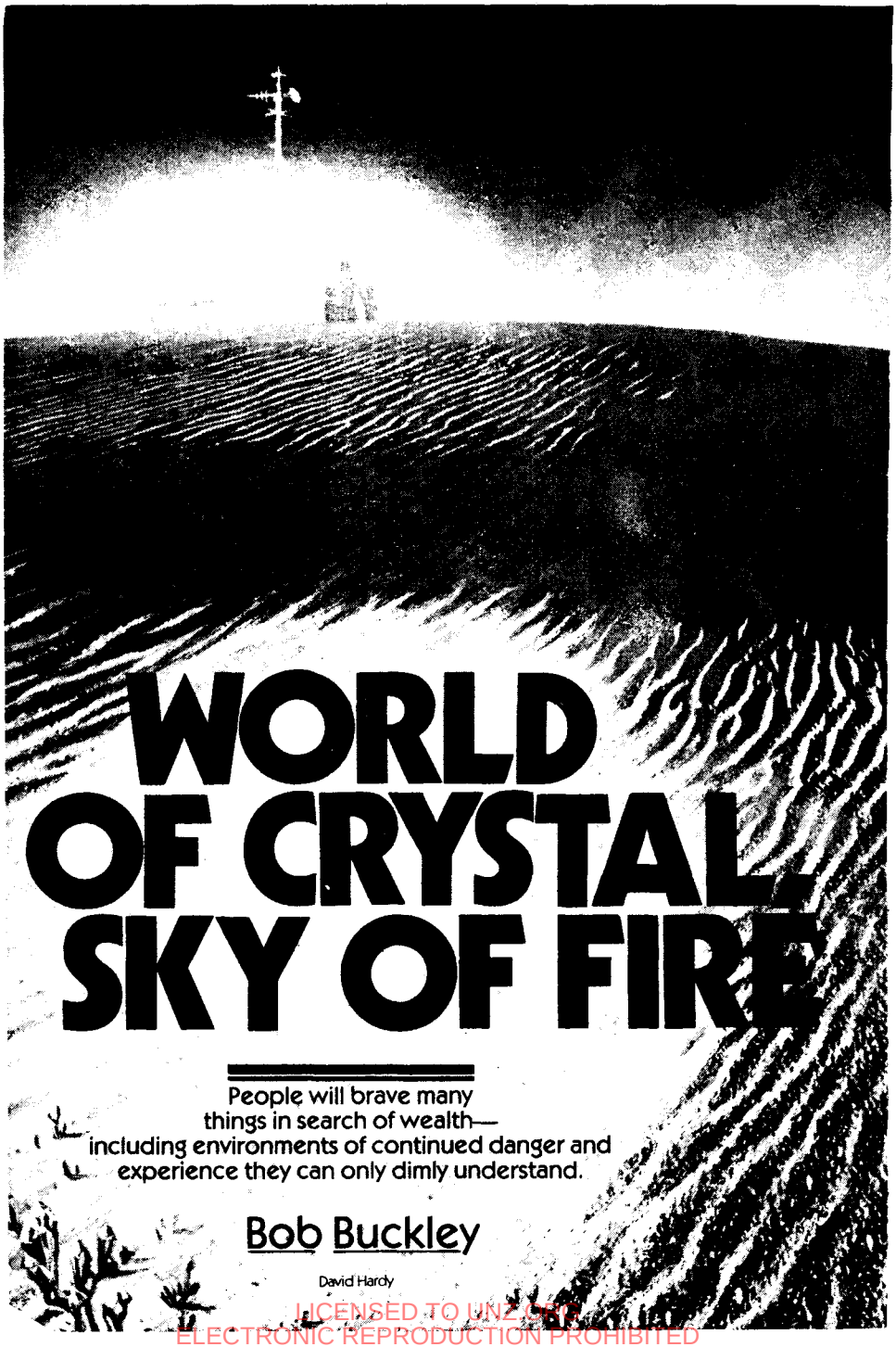

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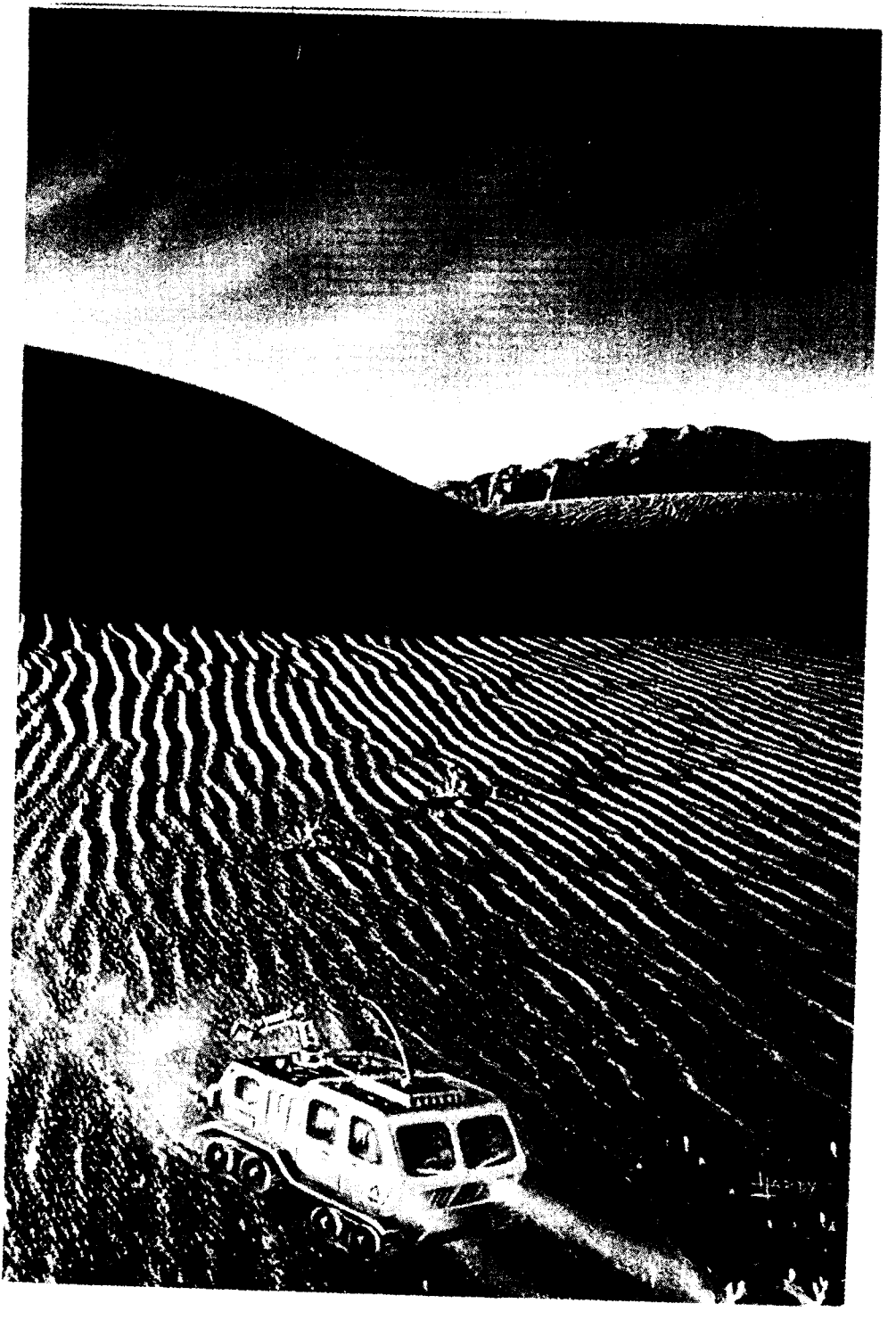

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Prologue

The ships loomed like technological refugees against the opalescent sky, buried deep in restless desert. Engines lay a hundred feet below the rippled dunes, crushed by the terrible weight of the smothering sand. These ships would not lift again, ever. Indestructable ceramometallic hull sections were eroded by a thousand years of space debris and the gritty, gnawing teeth of blinding storms. The ancient landing site had become a graveyard. The wanderers who once manned the vessels were dust. Only their servants remained. These were solitary ghosts, seldom seen, dark, skeletal figures who spoke not at all, but who sat often staring into the shining skies with dark, fathomless eyes. Desert philosophers all, the men, upon their coming, had thought these silent ones to be natives of the deadly desert slopes.

They would have laughed had they known.

The elder sat upon the sand and stared at distant mountains through a ruined door. A second gaunt figure, as black as ebony, studied the elder silently. Finally, with sinuous flickerings of its fingers, the elder "spoke."

"You are determined, then?"

"There is nothing more. This place is a museum. I guard memories."

"These were our masters." The elder chided gently.

"Masters who gave their servants the possibility of growth. I am not the Mynathan *of old; I thirst after fulfillment. This world is now a playground for the pale men. Let them have it, and the poisonous stones—those pretty toys that carpet the high places."*

"The stones are what brought our masters here."

"And what killed them. They were not prepared, they were foolish. Only the new men have protection. Our masters should have known."

"It is blasphemy to speak such of those who formed us."

The standing shape did not reply. It moved instead to the door and stepped out onto the glistening sand. "I will see you at the Springs, or I will see you never again."

The elder remained where it was, watching the tall figure stride determinedly across the dunes until it vanished.

"The masters did know," the withered fingers spoke at last, to nothing. "The burning stones were but a tool, a key to a door. You will know that, too . . . someday."

"The stones are," There was a long pause. Wright could hear the metallic native insects buzzing out their lives battling against the big plate windows in the front of the shop, ". . . well, interesting," The gem dealer was a squat, ruddy immigrant with a green visor. The ubiquitious shield unit strapped about his waist caused him to pulse behind a filmy aura, a necessary protection against radiation and heavy element poisoning. Chaldis was a deadly sphere trapped between the solar auras of triple dwarf stars. Yet the eternal wash of heavy elements from the solar winds had sown the rocky orb with a richness unequaled anywhere else in the galaxy. So they were all immigrants here, but Haybyod had lived in and around the raw-cut prefab city that swaggered across the yel-

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low plain forever, it seemed. All this hemisphere's scraggly bands of gem hunters were on a one-name basis with him. It was common need, really. The gem dealer was their livelyhood. Haybyod toyed with the translucent, multicolored crystals spotting the felt pouch while Wright tried to ignore the sweat trickling like twin rivers down his arms; fought to quell the nervous tremor that shook his right thumb with a palsy. Two stones did manage to gleam fitfully, but their glow was tired. A first quality fire-eye fully irradiated would have lit up the room, easily overpowering the ancient glowtubes strung haphazardly across the sheet-plastic ceiling of the midtown shop that Haybyod used for both residence and display of his wares, in addition to trading with his fieldmen.

Haybyod abruptly spoke his verdict. "Sorry, Wright. I've got trays full of these 'cold stones' already. They're tourist stuff, but the tourists have stopped tripping in. It may be weeks before the tour strike is over. Understand, I'd purchase them normally, but I'm overstocked. The stones are adequate; it's your timing that's bad."

Wright twisted thin hands, weathered dark by the chill nights and savage daywinds of Chaldis until they resembled gnarled roots torn from the parched alien soil. "I'm going out again real soon, just as soon's Mynathan's back. If he guides I know I can find a firstwater gemstone; maybe a Gold Eye." Wright stared at his worn, sand-caked boots. "But Margret and the kids need supplies to tide them over; garden failed again —black rust attacked the tubers. Not a big stake, of course, just something until our luck changes. It's been a bad season . . ."

"You say the aliens guide you . . . ?" Haybyod poked the stones inside, folded the small pouch and tugged it closed. He hesitated, then seemed to make a decision as he pushed the pouch into a hidden drawer at the rear of the light table. "Jamison has been wholesaling stuff like this to bulk exporters. I could act as your agent." His chubby, florid face twisted into a grin that made the tingler scar that jagged across his right cheek go white and shiny. Haybyod never talked much about himself. It was said a pension supported him from season to season while everybody downplanet anxiously waited out the ships that were always too widely spaced, and mostly filled with thrift-conscious retirees from the inner clusters.

Abruptly he turned around to a battered old data set atop a dusty desk littered with stacks of paper and moved his fingers on the keys. "There." His voice was matter-of-fact, as if he had just placed an order for a gross of light-pencils. "You've got a new limit on your charge. Mind you, though, I want first choice on all you find."

Wright nodded. He tried to meet the trader's eyes, but his pride balked at Haybyod's chin. "The culture bed's coming along real good." he blurted. "I think I can make a harvest before the first snow. There's two gold chips growing good and a big Emerald Eye that looks like a twenty weight."

"That's fine, Charlie." Haybyod rose, slowly and stiffly like an old tree, and they shook hands. "The strike's bound to be over before the snow flies."

"We pray that," Charlie Wright breathed, and turned quickly for the door, shamed that once again he had

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had to rely on Haybyod's limited funds just to live, but at the same time bouyed by the knowledge that they had two more months to eat. He'd go by the commissary first, pick up a few bags of foodstuffs. Treats for the boys. But Margret would have that sad smile when she saw him coming back with fresh fillings for the pantry and charged battery packs for the portable field generators that kept them safe from the constant wash of radiation from the suns. She hated his begging more than he did.

As Wright climbed into the battered four-track, the pulsating reflection of solar auras off the plate glass windows of the small shop made it impossible for him to see inside. So he never saw Haybyod fetch the worn pouch out of the drawer, grimace at it sadly, and toss it with a wry shake of his head into the trash binder.

Headlights jounced across the red, rutted road of crushed rock and abruptly picked out a spindly shape standing on the berm. An alien. The first few shiploads of planetbreakers had called the rare, solitary humanoids Chaldians, but then the ruined ships had been found in the high valleys and the governors had realized that the aliens were as much visitors as they, drawn like all other explorers by the dramatic coronal pulsations of the joined stars that formed the center of the tri-world system. Crystalline wealth lay scattered in glowing pockets throughout the tortured crust of this, the innermost world, the one a stellar survey had named Chaldis after a mythical spacefarer's siren.

It wasn't Mynathan standing there in the dark. Wright fought the surge of hope that had seized him. This native was white with age, his wrinkled hide blotched with the warts and gnarls common to his kind. He didn't wave, or make any sign at all as Wright slowed and passed at a crawl. The granitelike expression never varied as the dark swallowed the slender form and made it once more part of the night.

Wright accelerated, his skin suddenly alive with superstitious twinges. He fastened his hands over the big driving wheel and concentrated on the alien terrain. Chaldis was a curious mixture of mineral and organic shapes: sparkling brush that appeared in isolated clumps beyond the narrow trail, and an occasional imported solar grain condensation spire stabbing jaggedly toward the softly glowing sky. Five miles on, beyond the desolate valley where the road inched along a sheer bluff with a seemingly bottomless abyssal rift on one side, the warm glow of a habitat dome lit up the surrounding desert. It glimmered like an isolated star lost in the middle of the wilderness, close to the fields that still paid in first quality gems. Living out here was cheaper than living in town. Wright pulled the four track under the patched canopy of the vehicle shelter next to Margret's battered old Dust Jumper coupe and killed the rumbling whine of the turbine.

Little Peter was the first out the door. He was in his father's lap almost as soon as the cab door was open. Solemnly, the elder Wright passed over the tiny vial of Quince marmalade that had done much to deplete his newly augmented credit line. "It's from old London, on Earth," Wright told his son softly. "A ship brought it all this way."

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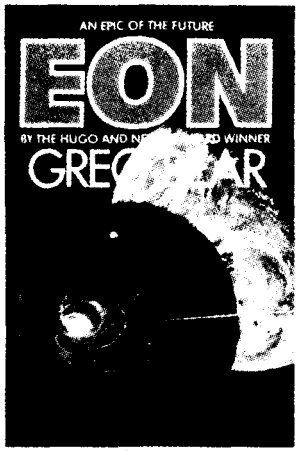

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"For me? Just for me?" The boy asked with the simple logic of the very young.

"Just for you. Now, let's get the carrier unloaded. I have supplies for everyone."

"Becky's had two new little ones." The boy blurted out, like it was news too good to keep.

Wright frowned as he swung open the carrier lid. He liked cats. But this stray seemed intent on populating all of this rocky waste, much to the ruin of his culture bed. "Well, that's good, Peter. Perhaps someone in town will want them."

"Oh, Bill Boy and I have already named them Sad Face and Whiskers. We couldn't give them away now. I just got them protection collars so they can go outside."

"But you already have six kittens by Becky. Eight will be too many to keep. They'll fight."

"They get along great. We all play—"

"Charlie!"

The new kittens were forgotten as Margret Wright ran out the door and kissed her husband, eyes questioning him about the day. Finally, after a hug, she whispered in his ear: "He bought them? How much did you get?"

"Well, enough for all this, and a bit of jelly for the boys."

"This much? Surely not. Those few poor stones. How could . . . ?"

She stopped and her face lost expression. "He gave you money, didn't he? You begged."

"No," Wright slammed the carrier lid angrily. "Haybyod just advanced us a stake against my next find. He's heard of Mynathan, all the dealers have. That canny scarecrow can sniff out a ripe gem pocket halfway across a continent. Haybyod knows his credit is safe."

He hefted the bags of supplies and headed for the entry, Margret dancing along behind him red-faced, too angry to speak. And as Wright stepped into the cluttered main room of the habitat, two hissing bundles of fur exploded across the carpeted decking and fastened themselves to his ankles. He shouted and almost dropped the groceries.

"Bad Whiskers, bad Sad Face," Little Peter shouted shrilly. "Leave Father alone."

Wright shook his foot and sent one of the kittens flying. It danced across the coffee table and upset a stack of teaching cassettes before disappearing behind a couch. He saw the mother scowling at him from the top of the book case, a brindled, slatternly old female with a chewed and withered ear and a broken tail half-naked from midpoint all the way back to the ratty tip. She bared her canines and hissed silently as his eyes met hers. Wright and this one were old enemies. They had found the cat outside the spaceport, probably a fugitive from one of the trampers that had set down for a fast cargo of light-weight, high value gemstones. Wright had chased it off, not liking its sleazy looks, but Peter had taken a fancy to the illegitimate scrounger, cradling it in his tiny arms the rest of that day. The same night Mister Teddy had gone into retirement and when Wright had gone in to kiss his son good night he had found the cat curled up on the foot of the boy's bed, yellow eyes glowing balefully at him. Little warmth had ever grown between them, and the sentiment was returned

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heartily from the opposite party. But with Margret's support Little Peter had managed to hang onto the stray. Four months later the first litter of kittens had appeared, and others regularly at intervals afterwards, although where the lust-driven cat managed to find other males in this godforsaken wilderness Wright could never understand. Cats did have their ways, though, ways bordering on the supernatural.

"Get those animals out of here," Margret ordered, coming to the rescue. "Peter, Billy, snap to. All cats in the play room, now!"

Wright left Margret bustling over dinner preparations and hurried to inspect the culture shed. The shed was like a greenhouse tacked onto the side of the habitat. It was there to catch the high-energy pulsations of the solar auras, not the orangish light of the multiple suns. The growing crystals were an investment better than a bank account. He had spent months collecting the right seed stones from rich valleys. The technique was slow, even experimental, but it meant that even while he was out prospecting the wild something was growing. The radiation streaming from the triple stars somehow stimulated crystalline growth. Perhaps it was the profusion of heavy elements in the rocks, a hidden danger of Chaldis against which all newcomers except the aliens needed protection. From the plots of dry sand slender crystal shafts mounted, sparkling in a thousand prismatic colors. He looked first for the Emerald Eye. The stone glimmered like a tiny green sun amid the sand. Then Wright sucked in his breath in horror. Both gold chips were dead, lifeless glass amid the ore lump that had nurtured them. The culture sand about their bases was roiled and padmarked with tiny feet. A dried brown dropping lay amid the nearest stone, despoiling its geometric perfection. The kittens!

Wright felt a surge of rage sweep through him.

"PETER!"

"Yes, Father."

"Come in here."

Small feet pattered on the decking. Wright turned and saw his son in the doorway with Billy peering impishly from behind one shoulder. If Peter was to be punished, the twin wanted to enjoy it firsthand after the nature of all small boys.

"The cats are not to be allowed in here. I've told you that."

"I know, father." The little face was pale behind its tan.

"Look at this."

The destruction was viewed seriously in silence. Billy abruptly withdrew to the safety of the house. Peter stared upwards at his father.

Somehow, this wasn't the reaction Wright had been expecting. There was no trigger here to provide for the release of his anger, the swift administration of punishment.

"The door was left open—" Peter said haltingly.

"By who?"

Again the hesitation. "I did it. I wanted to see the crystals."

Wright looked at his son and suddenly realized that he was lying. He leaned down and delivered a halfhearted whack to the trembling, but unflinching butt of the boy.

"Make sure you never let it happen

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again," he said huskily. "These crystals are food on your table. If the Emerald Eye fades there will be no food for cats, no more jars of jellies for you or your brother."

A quick nod.

"Now beat it. I've work to do in here."

The small shadow vanished and Wright set about smoothing the sand and removing the offending foreign matter from the culture. The two gold chips were dead, but it looked like several of the pinks were getting color to them. And maybe a Gold Eye was forming. If so, it would be the prize of the crop. One Gold Eye alone should pay off Haybyod's gamble. He hummed then as he worked the thin sand, cheered somewhat by this slim promise of future wealth.

Margret's knack for cooking made even plain fare seem an occasion. With a chill wind moaning fitfully outside the shelter they feasted on meat and gravy, the kitchen warm from the electric fire, and passed around bowls of spiced vegetables in savory sauces. Dessert was biscuits, still warm and steaming, smeared with jelly and dripping with pats of butter. The boys had gone to bed grinning and fat bellied and even the cats had taken to being put out with good graces, their usually lean stomachs packed with leftovers. Much later Wright pulled the quilt up around his chin contentedly and shifted his arm under Margret's weight.

"It won't last, will it?" Although calm, there was an anxious catch in her words. She had seen a different future than this desert waste in the tall independent briefly touring the capital of her home colony. It made him ache to remember the dreams they had shared so long ago: visions of farmlands stretching from valley wall to cleft, the hiss of irrigation heads stirring abundance from rich soils. Chaldis was supposed to have been a brief stopover to find the credits needed to put those dreams into reality. His plan had seemed foolproof. So many had found their wealth in these dry, solar corona-kissed sands. His oversight had been in the numbers. For each new-made millionaire with a gold eye clutched in his fist, a hundred losers scrabbled in the dust finding only worthless junk among the shards.

He sighed.

"After this dig we go back to Centran. I get my old job on the assembly mod. It wouldn't mean big money, but it's steady. We wouldn't have to watch the kids grub on crusts for months and then feast one day out of the year. It's not been fair to them, or to you. This weather maintenance job the spacefield's got you on doesn't pay enough to pay for the fuel it takes to run the perimeter."

"I haven't complained. I know you can find something. You have the knack. You're a thoughtful man, Charlie. That's why I married you instead of that loud Jack McCardy. Mynathan will help you."

Wright shifted uncomfortably under the covers. "I don't know. Rumor says Mynathan is dead, his body parching near Devil Spire. I heard it in the city. They say he never found the springs."

"Nonsense. That's one alien who knows the desert like the wrinkles on his hand. Don't you pay so much mind

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to that bar talk. Turn out the light. You've a long day tomorrow on the trail, and I have something to say to you tonight."

"Oh?" He grinned as he caught her teasing smile. The dry winds and lean days had only intensified her high-boned spartan features over the years. He flicked off the glow tubes and then buried his face in the pleated ropes of her hair. Outside the thick walls of the shelter, the wind moaned, snuffling among the flaking boulders and heaped sand for something to chill, one of the heavily armored Chaldian insects, anything.

Before dawn a rustling came at the portal. With sleep fogging his brain, Wright assigned the noise to a dream of endless barren tunnels and a blasting southerly blow, but abruptly he sat up in the cold darkness and realized that something was scratching softly at their door.

Margret stirred. He lifted the coverlet over her exposed shoulder protectively. Then he pulled on his pants, grabbed the ancient tingler hung over the plastic mantle of the electric fire, and padded to the entry. A dim shadow loomed against the thick, translucent glass.

The frosted port showed an alien face beyond. The aliens were basically nocturnal. They had never adjusted to the diurnal cycles of the humans they shared the planet with, so the visit was not that unusual. Wright slid the portal aside and waited silently for the shape to make the proper greeting. If he made the sign first it would reflect badly against him, making him seem too eager for the companionship.

The alien face was a dry, wrinkled mass of ocular shielding and nasal cartilage. There was a hint of machine about the body, a jointed stiffness. Where a mouth should have been there was only a slit far down on the bottom of the chin. Wright knew there was a parasitic ribbon there that could be everted for the taking of liquid sustenance. The large black eyes were cupped behind masses of protective bone. In this early morning darkness, the pupils were immense, swallowing up the glistening orbs.

The gnarled hand raised slowly and made a fist that suddenly opened into a writhing nest of slender fingers precisely forming the rapid-fire hand-talk of the trade lingo.

This was the wanderer from the road he had seen on the way out from town. That had been twenty klicks distant!

He made the answering gestures: "I see you, also. Make yourself welcome in this, our home. Will you take water?"

The ancient head bowed slightly to signify an affirmative.

Wright stepped aside and followed the alien into the tiny kitchen. The aliens were mildly addicted to Earth coffee. He started a pot brewing while offering a small glass of water drawn from the faucet at the sink. The alien held the container to its chin and Wright looked away so as not to be impolite. When he glanced back, the glass was empty.

"We will take refreshment," His hands said, and took the empty glass.

Margret appeared at the door suddenly, pulling her robe about her gown. Her eyes widened when she saw the alien.

"A guest." Wright nodded his head in the direction of the boy's room, and

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she nodded in understanding. Yes, she would keep them out until they had gone. There was the contract to handle still. Perhaps this was Mynathan's elder, the spiritual mentor that he had once described as a guide through the wilderness of the soul, a far more dangerous and trying journey than any across the wastes of Chaldis. Wright frowned. The rumors must be true. Mynathan had indeed perished in the outer desert.

The coffee timer clicked. The alien turned and stared at the machine solemnly. It watched patiently as Wright filled the mugs with the steaming liquid and hesitated at the creamer.

The alien nodded.

Wright poured, then lifted the sugar dispenser.

Again the rapid nod, twice.

Wright passed over the mug. How to begin? The aliens were not truly organic; some had speculated that they had not evolved at all, but were a form of silicon machine life created by some long-vanished and distant alien civilization. Their cultural mythology, perhaps it was best described as a religion, held two states: one material, the other an ethereal, pure energy state attained late in life, the "how" of that attaining an unknown fit only for speculation.

The alien drank, then put the nearly filled mug back on the table. The dark eyes found Wright's and the dancing fingers spoke:

"Long I wander, only to see death. I come now because a word lies broken. Perhaps you will understand. There is a balance in life. This balance must be kept, though death, time, chance itself, strive to intervene. Will you walk the wastes Mynathan once knew?"

Fighting to keep his excitement hidden and under control, Wright permitted himself a nod.

The alien seemed satisfied by the brusque gesture. It reached again for the coffee and drained the mug without any show of embarassment. This could only mean Wright was now considered to be a member of its ritual bonding.

Margret flashed a smile from the doorway just as a dark shadow flashed under the table, long legged and determined.

For the first time the alien looked startled as a scrawny furred length of lightning leapt into his arms and curled up on the thinly-fleshed bones of its lap.

"A pet," Wright signed. "I'll remove it."

"No need," the alien swiftly fingered back. Its wiry hand stroked the mottled fur. "This one has endured much to survive this long. I see a life checkered with hard lessons and lengthy journeys without resolution."

A loud noise filled the silent kitchen.

The cat was purring.

In the chill of the morning they left. Three weeks, no more, he told Margret as she trembled beside the window of the four track. Her slim figure had watched them out of sight, unmoving, joined suddenly by two small shapes that clung to her knees. Before leaving, Wright had made one last traverse of the habitat, looked in on the sleeping twins, checked the culture bed and its dimly glowing seed gems, and then gone out on the front landing. The alien was waiting patiently inside the four track looking like the sun-baked mummy of somebody's grandmother. It had lin-

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gered over the mother cat, bidding it a farewell usually reserved for a member of state. Wright had briefly considered presenting the animal to the alien since it seemed so attracted to the feline, but in the haste of the departure he had forgotten.

"The boys will miss not being able to tell you goodby," she had told him over the sill of the cab door, but he had kissed her and told her how this time he would bring back that farm, and the valley softened with greening crops.

That had been the departure. Hours had passed since. All three suns were high now, one blood red, another a pale mauve, the last the color of autumn hay. Multicolored shadows danced across the desert as they drove. In the first seventy miles the four track crawled up rutted slopes to high valleys where exposed clefts and hanging walls sparkled with radioactive residues. These tiny stones were new, and their dim lights faded quickly. None was worth taking. They jounced on into the mountain deserts, vast tablelands baking under the glare of the three suns, sharp-faced boulders thrusting out of the dune fields crusted with star sleet and budding seed stones. Then, as the four track had entered a blind valley, the alien elder had raised a withered arm and signaled a halt.

"Your stone grinder must stay here. We go now on foot where it is best to be nimble."

"The supplies?" Wright questioned.

"Carry what is needed. Leave the rest behind. Water will be your greatest need. The ancient springs are still many days distant."

That was the beginning of the trek. Wright remembered those prophetic words now as he dug his cheek into the gritty face of a sun-warmed dune and tasted salt on his tongue. Twelve days climbing through narrow crevices, through tunnels as dark as the wombs of Hell, and now this blazing wasteland with the suns so near it seemed he could reach up and crumple the blinding auras churning the sky about them like cheap tissue paper. The alien had gone on ahead, leaving him to watch the supplies. That had been hours ago when the suns were low. The alien was still not back and Wright feared the worst. Boots scrabbling at the last few feet of the rise, he heaved his body over the crest of the dune and collapsed in full view of a deliciously shaded pit. The rock was black. Memories of book-learned geologic science clicked in his sun-baked brain. Basalt. Here were the bones of the planet. Legends spoke of a lost caldera where pure, sweet water bubbled up endlessly from cracks in the deep crust. Water!

Wright propped himself up and tottered down the slope. Midway, bony hands as hard and as cold as metal seized his arms and clung to him. They helped him stagger downward to the springs. It was the elder, the spindly shape arriving from out of nowhere. Together they entered a shaded overhang and Wright sank down full length on the moist rock to bathe his face in the wetness sheeting down the rock wall. The pooled water at his feet orchestrated a symphony of delight. He rolled in it and laughed while the alien watched his frolics in detached bemusement.

Then Wright turned and saw the body in the natural alcove staring down at him

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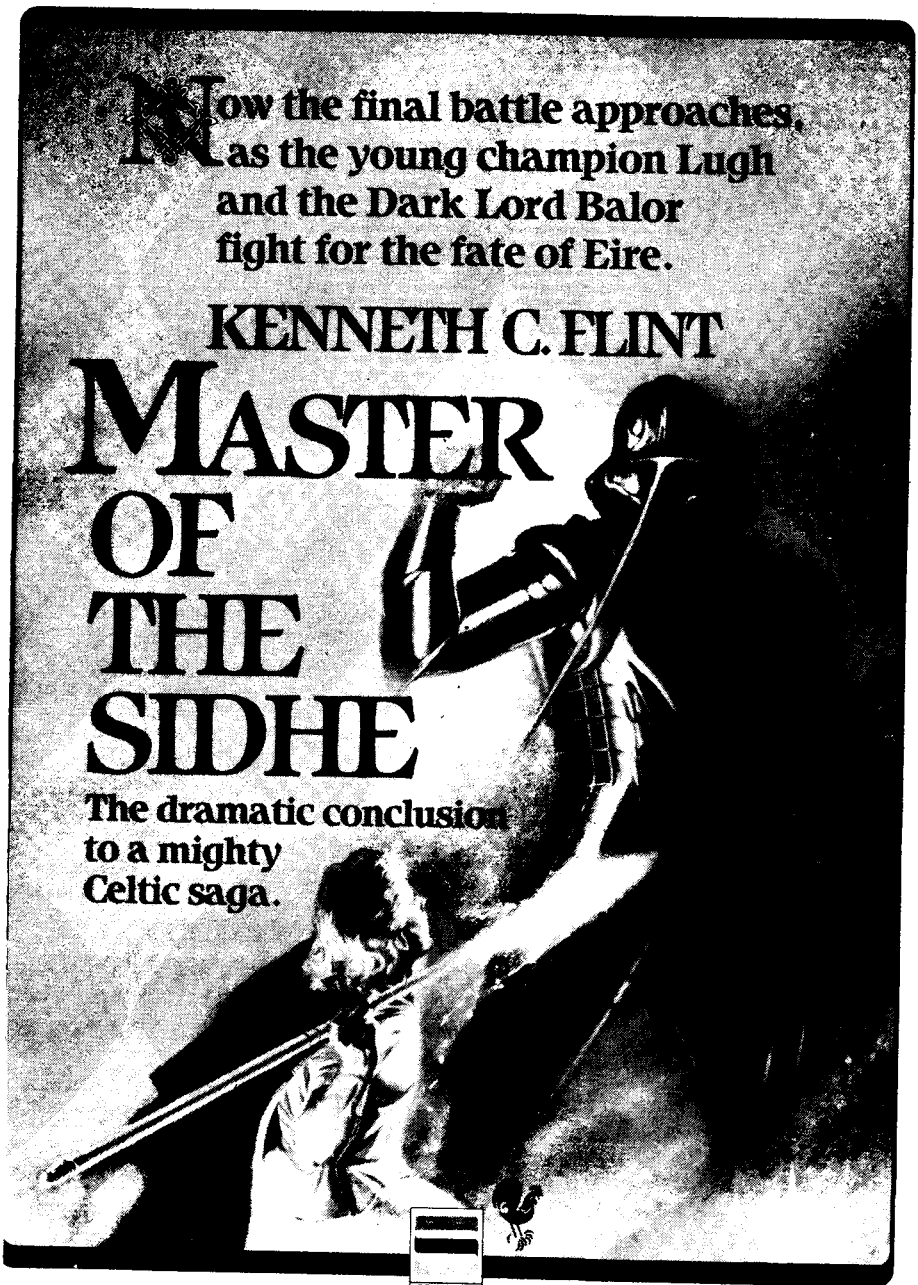

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with its sunken, fleshless eye sockets. Even in this dessicated state Wright recognized the alien features.

Mynathan! This place of eternal water held death. The rumor had been true.

The dead alien had been shown reverence by someone soon after death. its limbs had been arranged in a natural attitude before stiffness had set in, the palms were fixed to face upward atop the bony knees.

Wright touched a damp hand to his forehead in silent salute. This apparition of dessicated flesh and bone had shared the remarkably beautiful mother-of-pearl Chaldian nights with him at one time. They had stared together at blinding knots of world clusters while speculating on thoughts of a scale so grand they seemed foolish when cramped by the garish trappings of city boundaries. Such thoughts could not stand the harsh light of civilization. It was truth that only the desert hermit could see God.

"This was his choice," the elder signed. "I was with him when the call came and the decision took him. There remains but one thing to do. I needed help, someone young in case I faltered, or fell."

Wright followed unquestioningly as the elder led him up the slope of the caldera and out onto the north flank of the huge volcano. Above, the blinding faces of the three suns seemed close enough to scratch with a stick. Their auras beat at the ground with unrestrained violence. The thin air made Wright stumble clumsily across the rocky slope as if in a dream.

There were caves here, shallow pockets in the dark rock where the hidden ceilings were cool and heavy element condensation could occur as the solar winds swept past. They entered many searching for color, but found only minute beadings of junk stones. Then, in a crack that exposed a gas vesicle, formed when these ancient lavas had first belched out on this slope to cool millions of years ago, they discovered a display of multicolored perfection. Eyes of gold and emerald, and pinks and yellows of sizes from a hundred weight to many kilos. Wright gazed dumbly at the wealth, too stricken to even raise a blistered hand to touch the gems. The elder was not so reticent. It reached up reverently and detached two throbbing golds and a pair of pulsating emeralds from their delicate stems and placed them in a pouch at its side. Then it signed departure. Wright obeyed. Back at the springs, Wright bathed his scalded face in the soothing waters as the alien did something at the mummy's resting place.

"Observe," the ancient hands sang. "For countless millenia these mineral buds have been absorbing the castoff energy of suns. Now we release that store with but a thought . . ."

The withered hands moved deftly. Now a gold and a green crystal scintillated on each palm of Mynathan's hands. As Wright stared, baffled, auras formed, wrapping the mummy in wings of purest light. Haybyod had once told of a legend of the aliens being able to convert themselves into a higher energy state through a process that released subnuclear bonds. But Wright had not believed, it had seemed too fantastic. Quark physics were beyond him. Still . . . Suddenly the rock alcove was empty. A scattering of black dust sifted

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in a silent rain to the springs where the chuckling trickle of precious fluid carried it off down the rock face.

"Such is our fulfillment," and the elder brought the remaining stones to Wright and laid them on the ground in front of him where they gleamed like lost stars on the black rock. "You sought these. I have delivered them. Now let us be gone, for this is a holy place. The radiations are strong, perhaps too strong even for the protection you wear at your waist." One gnarled hand pointed at the field generator pulsing on Wright's hip and he looked down at it suddenly, as if seeing the everpresent device for the first time.

The walk out still lay ahead of them. The hot sands seemed to pass like an endless treadmill beneath Wright's boots as the trek wandered cross country. He recognized none of the rock formations; perhaps it was new territory. Storms roared out of the heights, blinding them with stinging dust, but always the elder led them onward. The miles ran away beneath their feet as the hours assembled themselves into days, and the grueling demands of the trek visibly slowed the mechanical efforts of the elder who sometimes seemed tired unto death. Wright supported the ancient with his arm as it stumbled along. Without the alien to guide him Wright knew he would soon be a blackened corpse shriveling in the endlessly shifting dust. Chaldis was as cruel to her visitors as she was to her few remaining native species.

A day and a night later they found the abandoned four track waiting beneath a blanket of fresh-blown dust. Wright did a little dance in the sand as it sunk in that he was a rich man. No more slogging it, this battered machine was his world. Now he felt in control again. Motioning the alien inside, he brushed the dust away from the windshield with frantic sweeps, then hauled himself up behind the wheel. As he drove swiftly along the trackless waste he saw not the dead and wind rippled mounds of sand, but green, green waving in countless rows waiting only for the touch of the harvester's blade. No more this arid mortuary, no more coaxing irradiated crystals to grow in beds of mineral oxides, soon he would sow real plants in real soil and reap an honest farmer's bounty.

Wright babbled his dreams to the alien as it sat silently in the seat beside him, staring straight ahead, never signing in reply. Finally, the lack of movement in the old hands alerted Wright. Worried, he reached over and touched the leathery shoulder. It slumped in the seat, limp. Quiet and undemonstrative in life, the elder had passed on in the same manner. Heavy lids covered its eyes.

The four track humped to a stop against a dune as Wright killed the engine, resting his head in unhappy exhaustion against the worn steering wheel. "Why now, old man? Why couldn't you have hung on until after we had gotten back and the stones had been sold? Now I owe you for the trip." His voice, sounded to him like a dusty croak.

The self pity session soon grew tiresome. With one amber sun low on the horizon, he dragged the elder from the cab with all the dignity the situation allowed, and worked to form a shelter out of loose slabs of sandstone. He

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placed the corpse within the shallow cave and stepped back to observe his handiwork. There was something wrong. The elder's hands were naked, pleading. He knew what they wanted. Well, they couldn't have it. Angrily Wright shook his head in rebellion and hauled himself back into the four track. He drove away fast into the deepening night. But the whining engine at full throttle could not drown out the prodding voice in his head, the little one that toyed with his conscience. Near midnight he found the road and turned south. Only two days more and then home, and Haybyod, and no more debts, no more Chaldis.

Then he slowed and stopped, the headlights playing far out across the paired ruts in the hard-packed gravel. Feathers of dust kicked up by a freshening wind straggled across the road.

"I can't do it, old man. Maybe there's too much of your Mynathan in me and not enough hard core businessman. Or maybe the frozen nights ate too deeply into my soul for it to rest with you lying out there waiting for a salvation that will never come. Your people's days have passed and we've come along to sweep the rest of you away. A brother would have saved you, wouldn't he? But you are the last, and now I'm the only one who can. I wonder if you realized that all along?"

The halting trip back to the elder's resting place was slow, Wright picking his way through a low grade Souther that screamed through the cracks in the cab and put a layer of talc-fine dust on the readouts. But something clued him as to the right spot to stop, and there it was, the stones half buried in a new dune, the elder's withered face gazing sightlessly at him. Wright brushed away the sand from the ancient palms, opened the pouch and placed the stones there, closing stiff fingers around them.

"You hold a woman's world there in those dead hands. If it weren't an eternity for you, I'd leave you here to feed the beetles. Just thought you ought to know."

He didn't hang around for the transformation. The wind was dropping and it looked like a clear run back to the road if he hurried. Well, there was still the culture bed. Wright soothed himself with that slender hope.

This time the drive went fast. Suddenly he was home. Margret met him at the portal, the boys already in bed, her face a testament for the words that she withheld. Disaster lurked in her eyes. He half-ran to the culture bed area and threw open the door. It was worse than disaster, it was ruin. The arid mineral-saturated sand was a shambles, crystal trees shattered and leaning in all directions. All the seed cores were dark. The crystalline growth process had halted. The half-grown gemstones were junk. All junk. He'd have to start the culture all over with new seed stones. It hurt to look at the ruin. Four years effort . . . dust.

Margret hovered beside him. "I found homes for two of the kittens in the city. One ran away, and another got caught in the wind turbine and was killed. Sam took the others for a tramper that was shipping out and needing mousers. Only Becky's left. No one wanted a cat that old. But she didn't do this. It was the young ones. The boys tried to keep them out, really they did, but you know how

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inquisitive kittens are. To their minds the crystals were just pretty toys."

Wright looked through the open doorway at the living room of the shelter, his gaze rising to where the old female's yellow eyes glared at him from her accustomed spot on the mantle. It was plain to see from the bulge of her body that she was about to litter again.

"I'll get the boy a new pet tomorrow. Something that doesn't dig."

"I know your trip went poorly and you're disappointed, but he loves the animal so, Charles."

"He loves eating too. This is our survival. The prospecting went badly, I came back empty. Now this. I know what I'm doing, Margret."

The desert was uncommonly quiet as he drove the lonely miles beyond the habitat and stopped on the rim of the valley. The yawning rift of the abyss lay beyond, just beside the road, a darkness so deep that no amount of light could fill it, certainly not the pale beams of the four track's driving lamps. Near him on the passenger seat there was a scuffling noise in the carrier box and an angry meow. The cat didn't like being confined.

"Relax, animal. You'll be at rest soon enough. You've spawned your last litter of demons to curse this man's life."

A loud hiss answered him. She was a smart one. Oh yeah! She knew his plans, damn her. Witch cat!

He grabbed the box and jumped out into the darkness. An icy wind gusted up from the valley floor as he stepped to the brink and hesitated for a second.

Had Margret been right? She had accused him of doing this because of his disappointment at coming back empty handed. Could he be putting human emotions on a dumb animal that could not possibly have a concept of what its actions had meant to his family? Deep inside he knew. The beast was gutter-smart and cunning, no innocent she. The anger surged again. The animal was cursed. It had wronged him on purpose. There was no other answer.

He raised the box over his head. Then stopped again in indecision. This didn't feel right. If this was to be an execution the animal shouldn't be smashed unknowingly inside a crate. To his mind that was more cruel than simply being tossed out into space. Death must be experienced to mean something.

The feline was crouched deep within the rear of the box when he opened the door. She tensed as he grabbed her, flaying the back of his hands with her claws. But he was the stronger and the more determined and the pain of her frantic tearing only made him feel more justified in his rage against her. Let her sing her death song loud and spit as much as she wanted. He raised her again and prepared to throw her out into the abyss. The wind gusted, tossing his hair in his face. Toward the south a star died in a long streamer of flame that ended behind dark, time-worn mountains. That was where the alien ships had been found rusting, buried to their bows in sand, the immense space coursing relics of an ancient civilization long forgotten. Wright hesitated again as a thought struck him like a bolt of ice. The elder had liked this cat. There had been respect between them. The alien would not approve of this death. Whether it be

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a silicon fabrication or not, the elder had certainly valued all things living, and this creature particularly, although for what reason Wright still did not understand. He lowered the cat slowly now, his options diminished. The beast was his for good, he was stuck with it. Disgustedly he replaced the growling cat in the box and carried it glumly back to the four track. Muttering incoherently, angry and at the same time saddened, Wright climbed up behind the wheel. Perhaps someone in the village would want . . .

"Life for a life. This trade I make for debts still owed." The calm voice seemed to speak from everywhere at the same time.

Wright froze and then looked hurriedly about. But the dark cab was empty of life except for the frightened cat scrabbling in the box furiously. Spooked, he started the engine and wheeled the big machine around. It jolted heavily back onto the road. A rock slammed against the undercarriage with a loud clang. "Slow down," he warned. "There's nothing out there, nothing in here. You're just imagining things." But he didn't believe it. Hard reality was courting superstition out here tonight. The cold wind whistling through the cab as he drove the four track wildly, like one possessed, toward the dim glow of the distant habitat. Even after reaching its safety he found himself trembling, his hands shaking. Finally, summoning his courage, he grabbed the carrier box and slowly, dejectedly carried it inside.

The living room was empty and dark. One lamp gleamed in the kitchen where Margret had waited up for him to return. She watched him put the box on the kitchen floor by the entry, her large, expressive eyes icy with undisguised contempt.

"Stow it." Wright banged back a chair from the little table and threw his aching length into it. His hands were still bruised and scabbed from moving the rough stones for the elder's tomb. He wanted a drink, but wouldn't let himself go for the refrigerator to get it. "The cat's in the box."

Little Peter burst into the room. "Where?" he cried in his high-pitched squeal. Then he was scrabbling at the wooden door. It flew open and a stiff-legged bundle of fur tumbled out. It wasn't a cat, or even a kitten, it wasn't anything Charlie Wright had ever seen before. But Peter snatched it up in his arms anyway and cradled it affectionately to his cheek.

"Oh, Dad. It's a Glis-zlis. None of the guys at class have one. The science teacher said they were all extinct."

Wright stared blankly at Margret, then at his son and the spidery concoction of legs, monkey-like face, and fur balled up in the tiny arms. "A what?"

"It's a native animal. Oh Dad. It's neat. Thanks." And then he was out of the room, shouting for Bill Boy at the top of his young lungs.

Margret stared at her puzzled husband suspiciously. "Just what did you do with the cat?"

"Nothing! I swear, so help me. I put it in the box and came right back here. I'll show you. The blamed thing must be cowering in the back of the carrier."

Margret knelt before the box and peered inside. "Empty! You're in trouble, Charlie. You lost the cat and put

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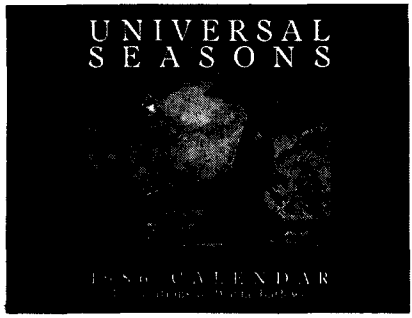

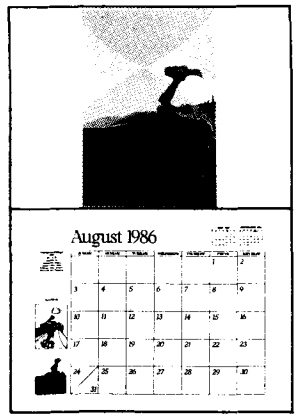

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that . . . that thing in its place just so Peter wouldn't hate you." She made a quick grab. "And what's this?"

She tossed a small pouch to Wright. He caught it clumsily. The pouch was heavy. A drawstring came unraveled as he shifted it in his hands and a pair of heavy stones rolled out into his palm. Immediately the wan light of the glow-tubes overhead paled as they were overwhelmed by a green-gold radiance. Margret gasped and took a step back.

"Charlie! They're wonderful. Where did you find them? Haybyod will pay a fortune for stones like that."

Wright tried to speak but couldn't. He was holding the biggest, weightiest pair of Gold and Emerald Eyes that he had ever seen or heard of. A million-plus years must have gone into their growth. They pulsed like baby suns as their stored solar energy ebbed out through multiple crystalline facets.

"I think we've come into some luck," he said almost hastily, anxious to change the subject. "Tomorrow I can have Haybyod weigh and size these, either could buy us passage out to one of the agricultural worlds."

"But Charlie. The cat?" Margret was amazed and pleased, but she wasn't about to let the missing pet issue die. Wright knew her too well to assume anything different.

"A friend has her. You didn't think I could actually kill the animal, do you?"

"Well—"

"Come on, there are times when my heart is as soft as my head; you know that." He put an arm about her and led her away from the table into the living room. "We'd better find out just what bad habits a Glis-zlis has. I don't want us waking up with something eating the bed out from under us . . ."

Beyond the brightly lit habitat, where an unfelt wind was blowing the all-encompassing darkness toward another dawn, the dim shade of the metamorphosized elder watched the happy activity within while a slender ghost finger stroked the battered cat curled up on his arm. No words passed between the two lifeforms—one an intricately organized matrix of handed sub-nuclear particles and quark essenses, the other a simple mechanism of low-energy, naturally evolved organics—but suddenly the cat meowed and rubbed her head against the insubstantial shadow that held her. Lights twinkled within the hazy mass of darkness where something like a head was barely visible atop the mostly amorphous form. To a hypothetical unseen watcher it would have appeared as if the elder glanced up at one particularly bright star and nodded.

"That one," the cat seemed to agree through some agency beyond speech, and with the swiftness of thought they were gone with only the wind to sing them a farewell. ■

● The brain is a wonderful organ; it starts working the moment you get up in the morning and does not stop until you get into the office.

Robert Frost

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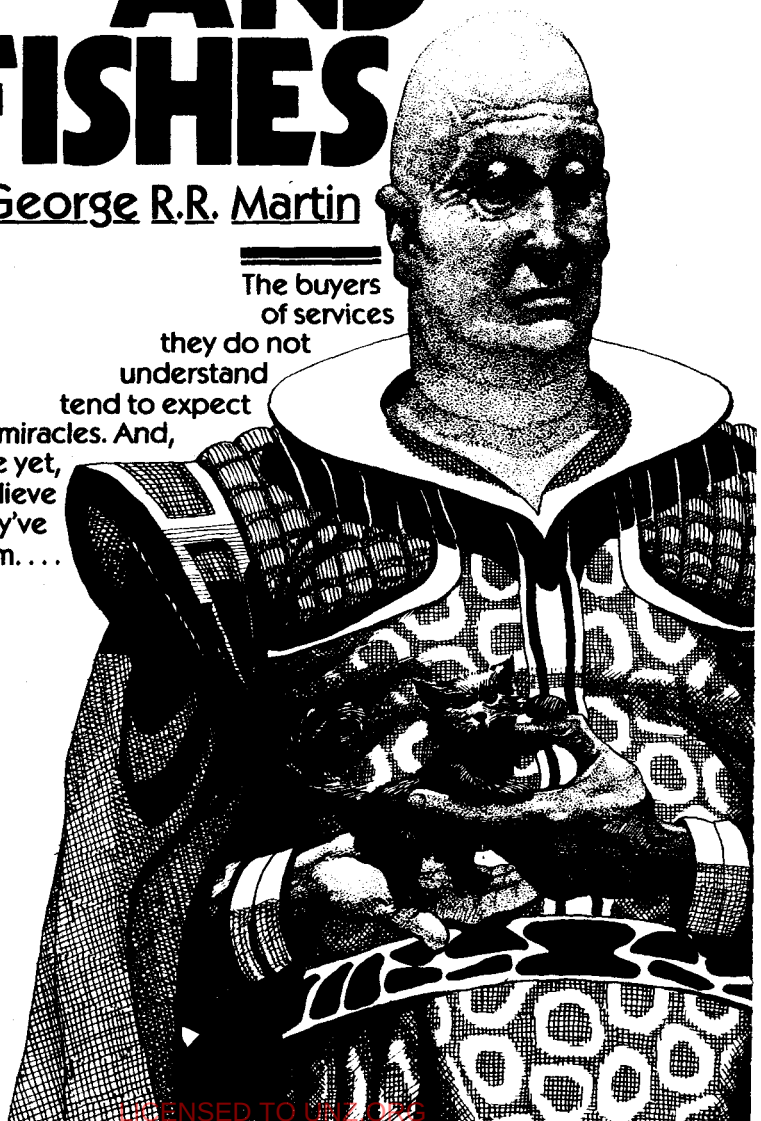
LOAVES AND FISHES

George R.R. Martin

The buyers of services they do not understand tend to expect miracles. And, worse yet, to believe they've got them. . . .



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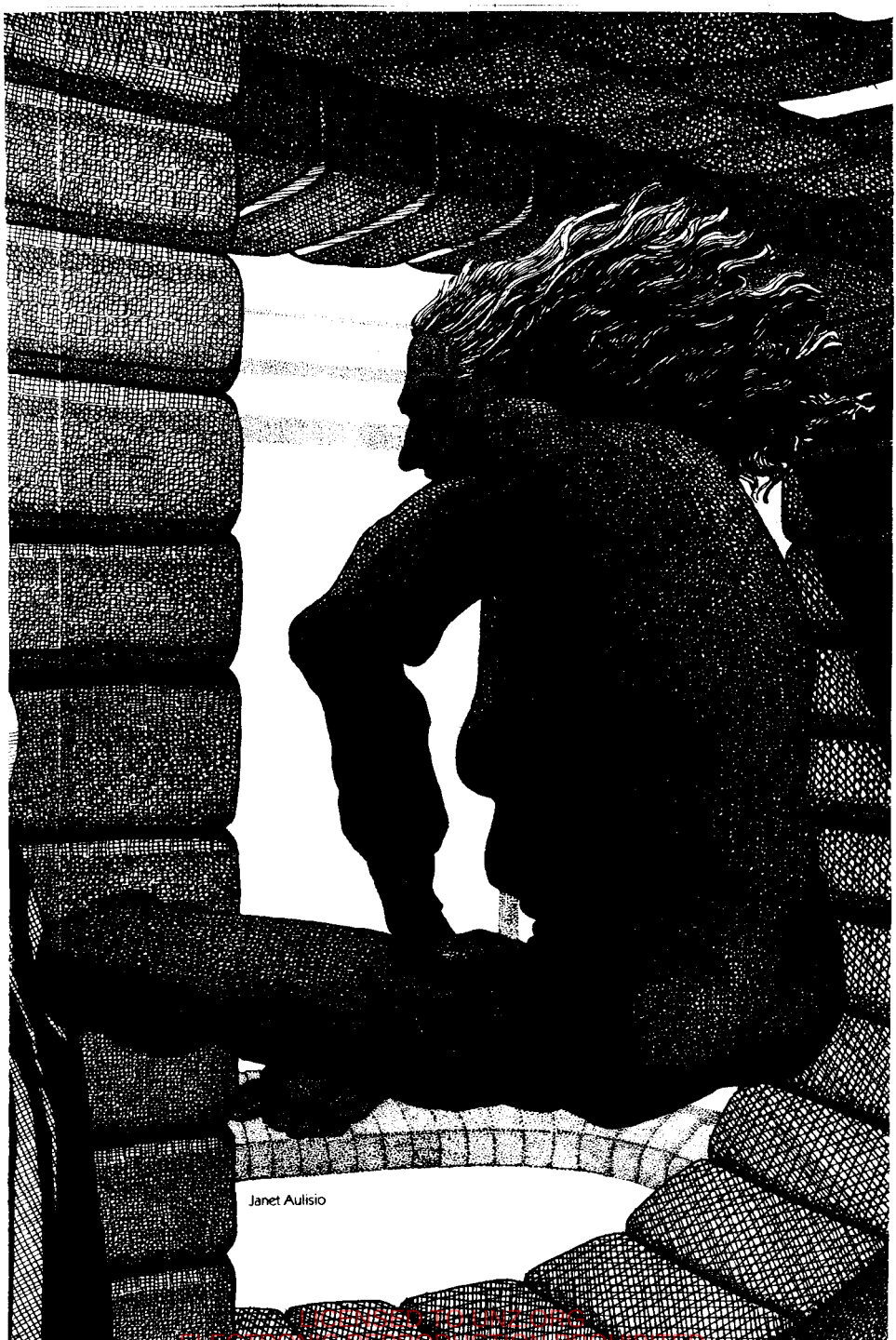

Janet Aulisio

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Her name was Tolly Mune, but they called her all sorts of things.

Those entering her domain for the first time used her title with a certain amount of deference. She had been Portmaster for more than forty standard years, and Deputy Portmaster before that, a colorful fixture in the great orbital community that was officially known as the Port of S'uthlam. Downstairs, planetside, the office was only another box on the bureaucratic flowcharts, but up in orbit the Portmaster was foreman, chief executive, judge, mayor, arbiter, legislator, mastermech, and head cop all in one. So they called her the P.M.

The Port had started small and grown over the centuries, as S'uthlam's swelling population made the world an increasingly important market and a key link in the network of interstellar trade for the sector. At port center was the station itself, a hollow asteroid some sixteen kilometers in diameter, with its parks and shops and dormitories and warehouses and labs. Six predecessor stations, each larger than the last and each now outdated, the oldest built three centuries back and no bigger than a good-sized starship, clung to the Spiderhome like fat metal buds on a stone potato.

Spiderhome was how they called it now, because it sat at the center of the web, an intricate silver-metal net cast across the dark of space. Radiating from the station in all directions were sixteen great spurs. The newest was four kilometers long, and growing; seven of the originals (the eighth had been destroyed in an explosion) stabbed twelve kays out into space. Inside the great tubes were the port's industrial zones: warehouses, factories, shipyards, customs gates and embarkation centers, plus docking facilities and repair bays for every class of starship known in the sector. Long pneumatic tubetrains ran through the center of the spurs, moving cargo and passengers from gate to gate and to the crowded, noisy, bustling nexus in Spiderhome, and the elevator downstairs.

Other, lesser tubes branched from the spurs, and still lesser passages from them, crossing and recrossing the void, binding everything together in a pattern whose intricacy grew each year as more and more additions were made.

And between the web strands were the flies: shuttles going up and down from the surface of S'uthlam with consignments too big or too volatile for the elevator, mining ships coming in with ore and ice from the Frags, food freighters from the terraformed farming asteroids inward they called the Larder, and all manner of interstellar traffic: luxurious Transcorp liners, traders from worlds as close as Vandeen or as distant as Caissa and Newholme, merchant fleets from Kimdiss, warships from Bastion and Citadel, even alien starcraft, Free Hruun and Raheemai and gethsoids and other, stranger species. They all came to the Port of S'uthlam and were welcome.

The ones who lived in Spiderhome, who worked in the bars and mess halls, moved the cargos, bought and sold, repaired and fueled the ships—they called themselves spinnerets as a badge of honor. To them, and to the flies who came calling often enough to be regulars, Tolly Mune was Ma Spider; irascible, foul-mouthed, rough-humored,

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frighteningly competent, omnipresent, indestructible, as big as a force of nature and twice as mean. Some of them, those who had crossed her or earned her displeasure, had no love for the Portmaster; to them she was the Steel Widow.

She was a big-boned, well-muscled, homely woman, as gaunt as any honest S'uthlamese but so tall (almost two meters) and so broad (those shoulders) that she had been considered something of a freak downstairs. Her face was as creased and comfortable as old leather. Her age was forty-three local, nearing ninety standard, but she didn't look an hour over sixty; she attributed that to a life in orbit. "Gravity's the thing that ages you," she would say. Except for a few starclass spas and hospitals and tourist hotels in the Spiderhome, and the big liners with their gravity grids, the Port turned in endless weightlessness; and free fall was Tolly Mune's natural element.

Her hair was silver and iron, bound up tightly when she worked, but off-duty it flowed behind her like a comet's tail, following her every motion. And she did move. That big, gaunt, raw-boned body of hers was firm and graceful; she swam through the spokes of the web and the corridors, halls, and parks of Spiderhome as fluidly as a fish through water, her long arms and thin, muscular legs pushing, touching, propelling her along. She never wore shoes; her feet were almost as clever as her hands.

Even out in naked space, where veteran spinnerets wore cumbersome suits and moved awkwardly along tether-lines, Tolly Mune chose mobility and form-fitting skinthins. Skinthins gave only minimal protection against the hard radiation of S'ulstar, but Tolly took a perverse pride in the deep blue-black cast of her skin, and swallowed anti-carcinoma pills by the handful each morning rather than opt for slow, clumsy safety. Out in the bright hard black between the web strands, she was the master. She wore airjets at wrist and ankle, and no one was more expert in their use. She zipped freely from fly to fly, checking here, visiting there, attending all the meetings, supervising the work, welcoming important flies, hiring, firing, solving any problem that might arise.

Up in her web, Portmaster Tolly Mune, Ma Spider, the Steel Widow, was everything she had ever wanted to be, equal to every task, and more than satisfied with the cards she'd drawn.

Then came a night-cycle when she was buzzed from a sound sleep by her Deputy Portmaster. "It better be goddamned important," she said when she stared at him over her vidscreen.

"You better access Control," he said.

"Why?"

"Fly coming in," he said. "Big fly."

Tolly Mune scowled. "You wouldn't dare wake me up for nothing. Let's have it."

"A *real* big fly," he stressed. "You have to see this. It's the biggest damn fly I've ever laid eyes on. Ma, no fooling, this thing is thirty kays long."

"Puling hell," she said, in the last uncomplicated moment of her life, before she made the acquaintance of Haviland Tuf.

She swallowed a handful of bright

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blue anti-carcinogens, washed them down with a healthy squeeze from a bulb of beer, and studied the holo apparition that stood before her. "Large ship you've got there," she said casually. "What the hell is it?"

"The *Ark* is a biowar seedship of the Ecological Engineering Corps," replied Haviland Tuf.

"The EEC?" she said. "You don't say?"

"Must I repeat myself, Portmaster Mune?"

"This is the Ecological Engineering Corps of the old Federal Empire, now?" she asked. "Based on Prometheus? Specialists in cloning, biowar, the ones who custom-tailored all kinds of ecological catastrophe?" She watched Tuf's face as she spoke. He dominated the center of her small, cramped, disorderly, and too-seldom-visited office in Spiderhome, his holographic projection standing among the drifting, weightless clutter like some huge white ghost. From time to time a balled-up sheet of paper floated through him.

Tuf was big. Tolly Mune had met flies who liked to magnify themselves in holo, so they came across as bigger than they were. Maybe that was what this Haviland Tuf was doing. Somehow she thought not, though; he didn't seem the sort. Which meant he really did stand some two-and-a-half meters tall, a good half-meter above the tallest spinneret she'd ever met. And that one had been as much a freak as Tolly herself; S'uthlamese were a small people. A matter of nutrition and genetics.

Tuf's face gave absolutely nothing away. It was long and pale, white as cow's milk, and sullied by neither a single hair nor the faintest trace of an expression. He interlocked his long fingers calmly on top of the swollen bulge of his stomach. "The very same," he replied. "Your historical erudition is to be commended."

"Why, thank you," she said amiably. "Correct me if I'm wrong though, but being historically erudite and all, I seem to recall that the Federal Empire collapsed, oh, a thousand years ago. And the EEC vanished too, disbanded, recalled to Prometheus or Old Earth, destroyed in combat, gone from human space, whatever. Of course, the Prometheans still have a lot of the old biotech, it's said. We don't get many Prometheans way out here, so I couldn't say for sure. But they're a bit jealous about sharing any of their knowledge, I've heard. So, let me see if I've got this straight: you've got a thousand-year-old EEC seedship there, still functional, which you just happened to find one day, and you're the only person on board and the ship is yours?"

"Correct," said Haviland Tuf.

She grinned. "And I'm the Empress of the Crab Nebula."

Tuf's face remained expressionless. "I fear I have been connected to the wrong person then. I wished to speak to the Portmaster of S'uthlam."

She took another squeeze of beer. "I'm the puling Portmaster," she snapped. "Enough of this goddamned nonsense, Tuf. You're sitting out there in a thing that looks suspiciously like a warship and happens to be about thirty times the size of the largest so-called dreadnaught in our so-called planetary defense flotilla, and you're making one hell of a lot of people extremely nerv-

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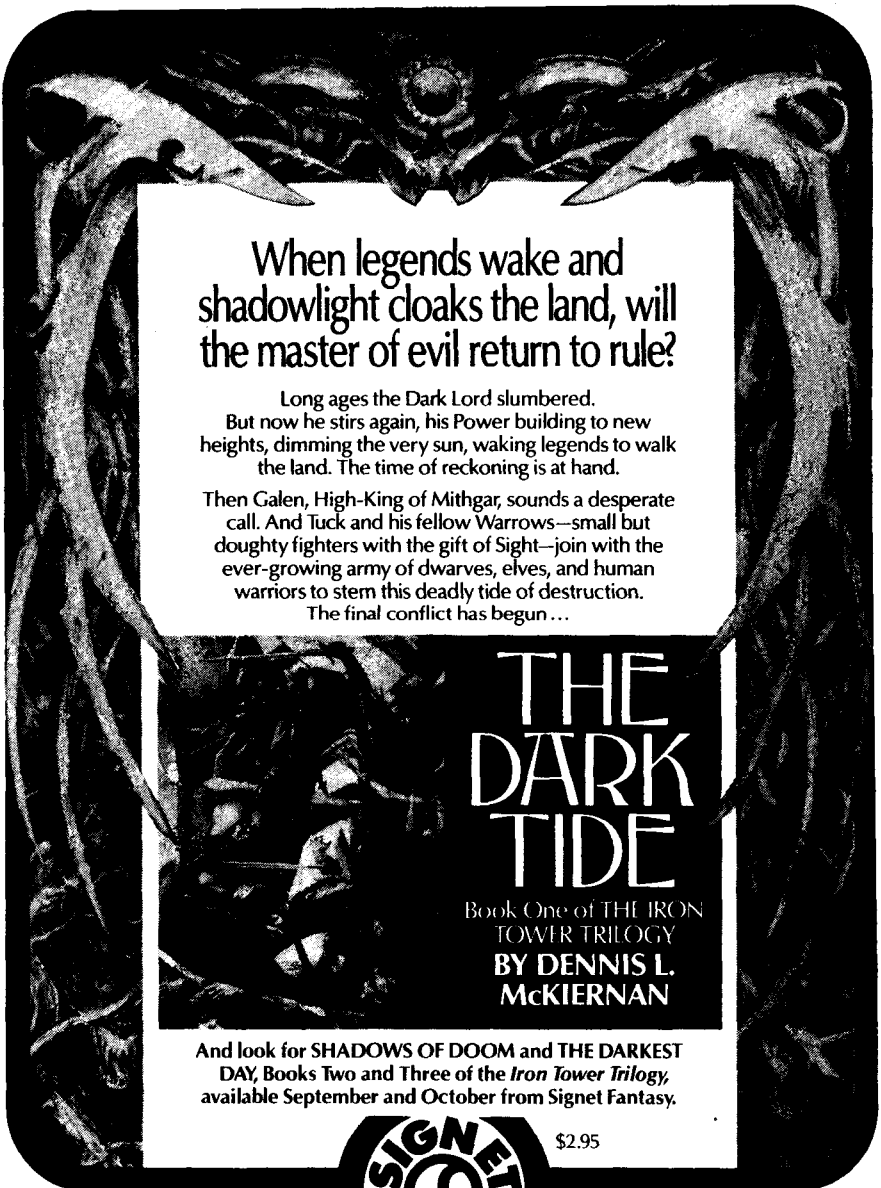

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ous. Half of the groundworms in the big hotels think you're an alien come to steal our air and eat our children, and the other half are certain that you're a special effect we've thoughtfully provided for their amusement. Hundreds of them are renting suits and vacuum sleds right now, and in a couple of hours they'll be crawling all over your hull. And my people don't know what the hell to make of you either. So come to the goddamned point, Tuf. What do you want?"

"I am disappointed," said Tuf. "I have hied myself here at great difficulty to consult the spinnerets and cybertechs of Port S'uthlam, whose expertise is far famed and whose reputation for honest, ethical dealing is second to none. I did not think to encounter unexpected truculence and unfounded suspicions. I require certain alterations and repairs, nothing more."

Tolly Mune was only half listening. She stared at the feet of the holographic projection, where a small, hairy, black-and-white thing had suddenly appeared. "Tuf," she said, her throat a little dry, "excuse me, but some kind of goddamned vermin is rubbing up against your leg." She sucked at her beer.

Haviland Tuf bent and scooped up the animal. "Cats may not properly be referred to as vermin, Portmaster Mune," he said. "Indeed, the feline is an implacable foe of most pests and parasites, and this is but one of the many fascinating and beneficial attributes of this admirable species. Are you aware that humanity once worshipped cats as gods? This is Havoc."

The cat began to make a deep rumbly noise as Tuf cradeled it in the crook of one massive arm and began to apply long, regular strokes to its black-and-white hair.

"Oh," she said. "A . . . pet, is that the term? The only animals on S'uthlam are food stock, but we do get visitors who keep pets. Don't let your . . . cat, was it?"

"Indeed," said Tuf.

"Well, don't let it out of your ship. I remember once when I was deputy P.M., we had the damndest mess . . . some brain-damaged fly lost his puling pet at the same time this alien envoy was visiting, and our security crews mistook one for the other. You wouldn't believe how upset everyone got."

"People are often over-excitable," said Haviland Tuf.

"What kind of alterations and repairs were you talking about?"

Tuf responded with a ponderous shrug. "Some small things, no doubt most easily accomplished by experts as proficient as your own. As you have pointed out, the *Ark* is indeed a most ancient vessel, and the vicissitudes of war and centuries of neglect have left their marks. Entire decks and sectors are dark and dysfunctional, damaged beyond the ship's admittedly admirable capacities for self-repair. I wish to have these portions of the craft repaired and restored to full function.

"Additionally, the *Ark*, as you might know from your study of history, once carried a crew of two hundred. It is sufficiently automated so that I have been able to operate it by myself, but not without certain inconveniences, it must be admitted. The central command center, located on the tower bridge, is a

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wearisome daily commute from my living quarters, and I have found the bridge itself to be inefficiently designed for my purposes, requiring me to walk constantly from one work station to the next in order to perform the multitude of complex duties required to run the ship. Certain other functions require me to leave the bridge entirely and journey hither and yon about the immensity of the vessel. Still other tasks I have found impossible to accomplish, since they would seem to require my simultaneous presence in two or more locations kilometers apart on different decks. Near to my living quarters is a small, yet comfortable, auxiliary communications room that appears to be fully functional. I would like your cybertechs to reprogram and redesign the command systems so that in future I will be able to accomplish anything that might need accomplishing from there, without the need of making the exhausting daily trek to the bridge, indeed without the need of leaving my seat.

"Beyond these major tasks, I have in mind only a few further alterations. Some minor modernizations, perhaps. The addition of a kitchen with a full array of spices and flavorings, and a large recipe library, in order that I might dine on food somewhat more varied and interesting to the palate than the grimly nutritious military fare the *Ark* is now programmed to provide. A large stock of beers and wines and the mechanisms necessary to ferment my own in future, during lengthy deep space voyagings. The augmentation of my existing entertainment facilities through the acquisition of some books, holoplays, and music chips dating from this last millennium. A few new security programs. Other trifling minor changes. I will provide you with a list."

Tolly Mune listened to him with astonishment. "Goddamn," she said when he had finished. "You really do have a derelict EEC seedship, don't you?"

"Indeed," said Haviland Tuf. A little stiffly, she thought.

She grinned. "My apologies. I'll scramble a crew of spinnerets and cybertechs, scream 'em right over to give a look, and we'll get you an estimate. Don't hold your goddamned breath, though. That big a ship, it'll take quite a while before they begin to sort things out. I'd better post some security too, or you'll have all kinds of curiosity seekers tramping through your halls and stealing souvenirs." She looked his hologram up and down thoughtfully. "I'll need you to give my crew a briefing and point them in the right direction. After that, it'd be better if you got out from underfoot and let them run amuck. You can't bring that damned monstrosity into the web, it's too puling big. You got any way of getting out of there?"

"The *Ark* is equipped with a full complement of shuttlecraft, all operational," said Haviland Tuf, "but I have scant desire to leave the comforts of my quarters. Certainly my ship is large enough so that my presence will not seriously inconvenience your crews."

"Hell, you know that and I know that, but they work better if they don't think someone's looking over their shoulders," said Tolly Mune. "Besides, I'd think you'd want to get out of that can a bit. You've been shut up alone for how long?"

"Several standard months," Tuf ad-

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mitted, "although I am not strictly alone. I have enjoyed the company of my cats, and have pleasantly occupied myself learning the capabilities of the *Ark* and expanding my knowledge of ecological engineering. Still, I will concede your point that perhaps a bit of recreation is in order. The opportunity to sample a new cuisine is always to be relished."

"Wait'll you try S'uthlamese beer! And the port has other diversions as well. Exercise facilities, hotels, sports, drug dens, sensoria, sex parlors, live theater, gaming halls."

"I have some small skill at certain games," Tuf said.

"And then there's tourism," Tolly Mune said. "You can just take the tubetrain down the elevator to the surface, and all the districts of S'uthlam are yours to explore."

"Indeed," said Tuf. "You have intrigued me, Portmaster Mune. I fear I am of a curious temperament. It is my great weakness. Unfortunately, my funds preclude a lengthy stay."

"Don't worry about that," she replied, smiling. "We'll just put it on your repair bill, settle up afterwards. Now, just hop in your goddamned shuttle and bring yourself to, let's see, dock nine-eleven is vacant. See the Spiderhome first, then take the train downstairs. You ought to be a goddamned sensation. You're on the newsfeeds already, you know. The groundworms and flies will be crawling all over you."

"A decaying piece of meat might find this prospect appealing," said Haviland Tuf. "I do not."

"Well then," the Portmaster said, "go incognito."

* * *

The steward on the tubetrain wheeled out a tray of beverages shortly after Haviland Tuf had strapped himself in for the trip downstairs. Tuf had sampled S'uthlamese beer in the restaurants of Spiderhome, and found it thin, watery, and notably devoid of taste. "Perhaps your offerings include some malt products brewed offworld," he said. "If so, I would gladly purchase one."

"Certainly," the steward said. He reached into the cart and produced a squeeze bulb full of dark brown liquid, bearing a cursive logo Tuf recognized as ShanDellor script. A card plate was offered, and Tuf punched in his code number. The S'uthlamese currency was the calorie; the charge for the bulb amounted to almost four and a half times the actual caloric content of the beer, however. "Import costs," the steward explained.

Tuf sucked his bulb with ponderous dignity as the tubetrain fell down the elevator toward the surface of the planet below. It was not a comfortable ride. Haviland Tuf had found the cost of star class accomodations prohibitively high, and had therefore settled for premiere class, the next best available, only to discover himself crammed into a seat seemingly designed for a S'uthlamese child, and a small S'uthlamese child at that, in a row of eight similar seats divided by a narrow central aisle.

Sheer chance had given him the aisle seat, fortunately; without such placement, Tuf entertained grave doubts about whether he could have made the voyage at all. But even here, it was impossible to move without brushing against the bare thin arm of the woman to his

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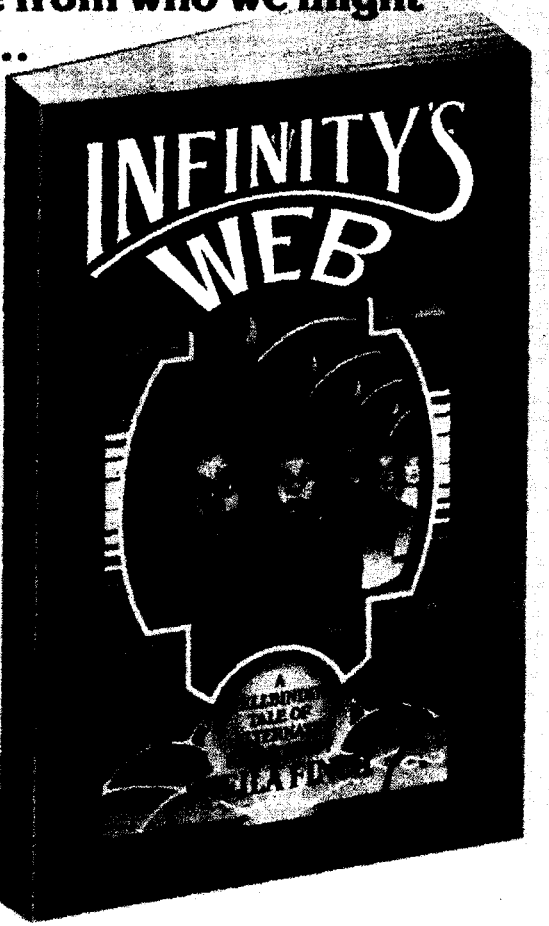

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left, a contact that Tuf found distasteful in the extreme. When he sat in his accustomed manner, the crown of his head bumped against the ceiling, so he was forced to hunker down, and tolerate a most annoying tightness in his neck as a result. Further back on the tubetrain, Tuf understood, were the first, second, and third-class accomodations. He resolved to avoid experiencing their dubious comforts at all costs.

When the descent commenced, the majority of the passengers pulled privacy hoods down over their heads, and punched up the personal diversion of their choice. The offerings, Haviland Tuf noted, included three different musical programs, a historical drama, two erotic fantasy loops, a business interface, something listed as a "geometric pavane," and direct stimulation to the pleasure center of the brain. Tuf considered investigating the geometric pavane, until discovering that the privacy hood was too small for his head, his skull being unduly large and long by S'uthlamese standards.

"You the big fly?" asked a voice from across the aisle.

Tuf looked over. The S'uthlamese were sitting in silent isolation, their heads enveloped by their dark eyeless helmets. Aside from the cluster of stewards far at the rear of the car, the only passenger still in the world of reality was the man in the aisle seat across from him one row back. Long, braided hair, copper-colored skin, and plump, fleshy cheeks branded the man as much an offworlder as Tuf himself. "The big fly, right?"

"I am Haviland Tuf, an ecological engineer."

"I knew you were a fly," the man said. "Me too. I'm Ratch Norren, from Vandeen." He held out a hand.

Haviland Tuf looked at it. "I am familiar with the ancient ritual of shaking hands, sir. I have noted that you are carrying no weapons. It is my understanding that the custom was originally intended to establish this fact. I am unarmed as well. You may now withdraw your hand, if you please."

Ratch Norren grinned and pulled back his arm. "You're a funny duck," he said.

"Sir," said Haviland Tuf, "I am neither a funny duck nor a large fly. I would think this much obvious to any person of normal human intelligence. Perhaps standards are different on Vandeen."

Ratch Norren reached up and pinched his own cheek. It was a round, full, fleshy cheek, covered with red powder, and he gave it a good strong pinch. Tuf decided this was either a particularly perverse tic or a Vandeeni gesture the significance of which escaped him. "The fly stuff," the man said, "that's just spinneret talk. An idiom. They call all us offworlders flies."

"Indeed," said Tuf.

"You are the one who arrived in that giant warship, right? The one that was on all the newsfeeds?" Norren did not wait for an answer. "Why are you wearing the wig?"

"I am traveling incognito," said Haviland Tuf, "though it appears that you have penetrated my disguise, sir."

Norren pinched his cheek again. "Call me Ratch," he said. He looked Tuf up and down. "Pretty feeble disguise, though. Wig or no wig, you're still a

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big fat giant with a complexion like a mushroom."

"In future, I shall employ make-up," said Tuf. "Fortunately, none of the native S'uthlamese have displayed your perspicacity."

"They're just too polite to mention it. That's how it is on S'uthlam. There's so many of them, you know? Most of them can't afford any kind of real privacy, so they go in for a lot of pretend privacy. They won't take any notice of you in public unless you want to be noticed."

Haviland Tuf said, "The inhabitants of Port S'uthlam that I encountered did not seemly unduly reticent, nor overburdened with elaborate etiquette."

"The spinnerets are different," Ratch Norren replied offhandedly. "Things are looser up there. Say, let me give you a little advice. Don't sell that ship of yours here, Tuf. Take it to Vandeen. We'll give you a lot better price for it."

"It is not my intention to sell the *Ark*," Tuf replied.

"No need to dicker-daddle with me," Norren said. "I don't have the authority to buy it anyhow. Or the standards. Wish I did." He laughed. "You just go to Vandeen and get in touch with our Board of Coordinators. You won't regret it." He glanced about, as if he were checking to see that the stewards were far away and the other passengers still dreaming behind their privacy helmets, and then dropped his voice to a conspiratorial whisper. "Besides, even if the price wasn't a factor, I hear that warship of yours has got nightmare-class power, right? You don't want to give the S'uthlamese power like that. No lying, I love 'em, I really do, come here regularly on business, and they're good people, when you get one or two of them alone, but there are so *many* of them, Tuffer, and they just breed and breed and breed, like goddamned rodents. You'll see. A couple centuries back, there was a big local war just on account of that. The suthies were planting colonies all over the damned place, grabbing every piece of real estate they could, and if anybody else happened to be living there, the suthies would just outbreed 'em. We finally put an end to it."

"We?" said Haviland Tuf.

"Vandeen, Skrymir, Henry's World, and Jazbo, officially, but we had help from a lot of neutrals, right? The peace treaty restricted the S'uthlamese to their own solar system. But you give them that hellship of yours, Tuf, and maybe they break free again."

"I had understood the S'uthlamese to be a singularly honorable and ethical people."

Ratch Norren pinched his cheek again. "Honorable, ethical, sure, sure. Great folks to cut deals with, and the swirls know some blistery erotic tricks. I tell you, I got a hundred suthie friends, and I love every one of 'em. But between them, my hundred friends must have maybe a thousand children. These people breed, that's the problem, Tuf, you listen to Ratch. They're all liferoos, right?"

"Indeed," said Haviland Tuf. "And what, might I inquire, is a liferoo?"

"Liferoos," Norren repeated impatiently. "Anti-entropists, kiddie-culters, helix-humpers, genepool puddlers. Religious fanatics, Tuffer, religious crazies." He might have said more, but the

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steward was wheeling the beverage cart back down the aisle just then. Norren sat back in his seat.

Haviland Tuf raised a long pale finger to check the steward's progress. "I will have another bulb, if you please," he said. He hunched over in silence for the remainder of the trip, sucking thoughtfully on his beer.

Tolly Mune floated in her cluttered apartment, drinking and thinking. One wall of the room was a huge vidscreen, six meters long and three meters high. Customarily, Tolly keyed it to display scenic panoramas; she liked the effect of having a window overlooking the high, cold mountains of Skrymir, or the dry canyons of Vandeen with their swift whitewater rivers, or the endless city lights of S'uthlam itself spreading across the night with the shining silver tower that was the base of the elevator ascending up and up and up into the dark, moonless sky, soaring high above even star-class tower-homes four kays tall.

But tonight she had a starscape spread across her wall, and against it was outlined the grim metallic majesty of the immense starship called *Ark*. Even a screen as large as hers—one of the perks of her status as Portmaster—could not really convey the ship's sheer size; thirty kays long, five kays wide at its widest point and narrowing fore and aft, three kays high, lines broken by the great domed landing deck large as any city spacefield and the control tower that ascended another kilometer from the topmost deck.

And the things it represented, the hope, the threat, were immeasurably bigger than the *Ark* itself, Tolly Mune knew.

Off to her side, she heard the buzzing of her com unit. The computer would not have disturbed her unless it was the call she had been waiting for. "I'll take it," she said. The stars blurred, the *Ark* dissolved, and the vidscreen ran with liquid colors for an instant before resolving itself into the face of First Councilor Josen Rael, majority leader of the Planetary High Council.

"Portmaster Mune," he said. At this merciless magnification, she could see all the tension in his long neck, the tightness around the thin lips, the hard glitter in his dark brown eyes. The top of his head, domed and balding, had been powdered but was beginning to sweat nonetheless.

"Councilor Rael," she replied. "Good of you to call. You've gone over the reports?"

"Yes. Is this call shielded?"

"Certainly," she said. "Speak freely."

He sighed. Josen Rael had been a fixture in planetary politics for a decade now. He had first made the newsfeeds as councilor for war, later had climbed to councilor for agriculture, and for four standard years he had been the leader of the council's majority faction, the technocrats, and therefore the single most powerful man on S'uthlam. The power had made him look old and hard and tired, and this was the worst Tolly Mune had ever seen him. "You're certain of the data, then?" he said. "Your crews have made no mistake? This is too crucial for error, I don't have to tell you that. This is truly an EEC seedship?"

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"Damn right," said Tolly Mune. "Damaged and in disrepair, yes, but the puling thing is still functional, more or less, and the cell library is intact. We've verified it."

Rael ran long, blunt fingers through his thinning white hair. "I should be jubilant, I suppose. When this is over, I will have to pretend to be jubilant for the newsfeeds. But right now, all I can think of are the dangers. We've had a council meeting. Closed. We can't risk too much getting out until the affair is settled. The council was largely in accord. Technocrats, expansionists, zeros, the church party, the fringe factions." He laughed. "I've never seen such unanimity in all the years I've served. Portmaster Mune, we must have that ship."

Tolly Mune had known it was coming. She had not been Portmaster this long without understanding the politics of the society downstairs. S'uthlam had been locked into endless crisis all her life. "I'll try to buy it for you," she said. "This Haviland Tuf was a freelance trader originally, before he stumbled on the *Ark*. My crews found his old ship on the landing deck, in terrible shape. Traders are greedy abortions, every one of them. That should work for us."

"Offer him whatever it takes," said Josen Rael. "Do you understand, Portmaster? You have unlimited budgetary authority."

"Understood," said Tolly Mune. But there was another question to be asked. "And if he won't sell?"

Josen Rael hesitated. "Difficult," he muttered. "He must sell. A refusal

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would be tragic. Not for the man himself, but for us, perhaps, perhaps."

"If he won't sell?" Tolly Mune repeated. "I need to know the alternatives."

"We must have the ship," Rael told her. "If this Tuf proves unreasonable, he gives us no choice. The High Council will exercise its right of eminent domain and confiscate. The man will be compensated, of course."

"Damn. You're talking about seizing the ship by force."

"No," said Josen Rael. "Everything would be proper, I've checked. In an emergency, for the good of the greatest number, the rights of private property must be set aside."

"Oh, hell and damn, that's puling rationalization, Josen," said Tolly Mune. "You had more common sense when you were up here. What have they done to you downstairs?"

He grimaced, and for an instant he looked a little like the young man who had worked at her side for a year, when she had been deputy portmaster and he third assistant administrator for interstellar trade. Then he shook his head, and the old, tired politician was back. "I don't feel good about this, Ma," he said, "but what choice do we have? I've seen the projections. Mass famine within twenty-seven years unless we have a breakthrough, and there's no breakthrough in sight. Before it comes to that, the expansionists will regain power and we'll have another war, perhaps. Either way, millions will die. Billions perhaps. Against that, what are the rights of this one man?"

"I won't argue that point, Josen, though there are those who would, you know that. But never mind. You want to be practical, I'll give you some goddamned practical things to think over. Even if we *buy* this ship from Tuf legally, there's going to be hell to pay with Vandeen and Skrymir and the rest of the allies, but I doubt that they'd try anything. If we grab it by force, though, that's a set of coordinates to a whole different place, a hard place too. They can say piracy, maybe. They can define the *Ark* as a military craft—which it was, by the way, and a puling world-buster too—and say we're in violation of the treaty and come after us again."

"I'll speak to their envoys personally," said Josen Rael wearily, "assure them that as long as the technocrats are in power, the colonization program will not be resumed."

"And they'll take your puling word? Like goddamned horny hell they will. And will you assure them that the technocrats are *never* going to lose power, that they'll never have the expansionists to deal with again? How will you do that? Are you planning to use the *Ark* to establish a benevolent dictatorship?"

The councilor pressed his lips together tightly, and a flush crept up the back of his long, dark neck. "You know me better than that. Agreed, there are dangers. The ship is a formidable military resource, however, let us not forget that. If the allies mobilize against us, we will hold the trump card."

"Nonsense," said Tolly Mune. "It has to be repaired and we have to master it. The technology involved has been lost for a thousand years. We'll be studying it for months, maybe years, before we can really use the goddamned thing. Only we won't get the chance.

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The Vandeeni armada will arrive within weeks to take it away from us, and the others won't be far behind them."

"None of this is your concern, Portmaster," said Josen Rael coldly. "The High Council has discussed the issue thoroughly."

"Don't try and pull rank on *me*, Josen. Remember the time you got drunk on narco-blasters and decided you'd go outside and see how fast urine crystallized in space? I was the one who talked you out of freezing off your hose, esteemed First Councilor. Clean out your puling ears and listen to me. Maybe war isn't my concern, but trade is. The port is our lifeline. We import thirty per cent of our raw calories now—"

"Thirty-four percent," Rael corrected.

"Thirty-four per cent," Tolly Mune agreed. "And that is going to go nowhere but up, we both know it. We pay for that food with our technological expertise, both manufactured goods and port profits. We service, repair, and build more starships than any other four worlds in the sector, and you know why? Because I've busted my puling buns to make sure we're the *best*. Tuf himself said it. He came here for repairs because we had a reputation, a reputation for being ethical, honest, and fair as well as technically competent. What's going to happen to that reputation if we confiscate his puling ship? How many other traders are going to bring in *their* ships for repairs if we feel free to help ourselves to any we like? *What's going to happen to my goddamned port?*"

"It would certainly have an adverse effect," Josen Rael admitted.

Tolly Mune made a loud crude noise

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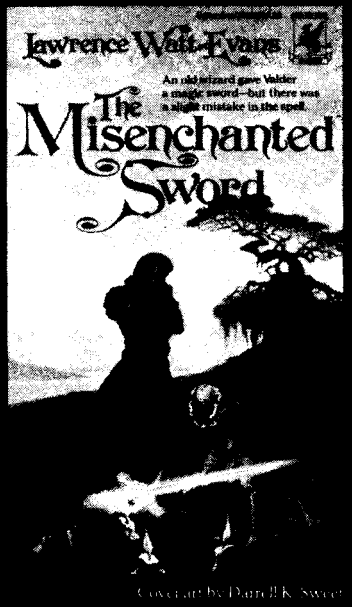
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at him. "Our economy will be destroyed," she said bluntly.

Rael was sweating heavily now, trickles of moisture running down the broad, domed forehead. He mopped at the moisture with a pocket cloth. "Then you must see that it doesn't happen, Portmaster Mune. You must see that it doesn't come to that."

"How?"

"Buy the *Ark*," he said. "I delegate full authority to you, since you seem to understand the situation so well. Make this Tuf person see reason. The responsibility is yours." He nodded, and the screen went black.

On S'uthlam, Haviland Tuf played the tourist.

It could not be denied that the world was impressive, in its way. During his years as a trader, hopping from star to star in the *Cornucopia of Excellent Goods at Low Prices*, Haviland Tuf had visited more worlds than he could easily remember, but he would be unlikely to forget S'uthlam any time soon.

He had seen a goodly number of breathtaking sights: the crystal towers of Avalon, the skywebs of Arachne, the churning seas of Old Poseidon and the black basalt mountains of Clegg. The city that was S'uthlam—the old names were only districts and neighborhoods now, the ancient cities having grown into one swollen megalopolis centuries ago—rivaled any of them.

Tuf had a certain fondness for tall buildings, and he gazed out upon the cityscape both by day and night, from observation platforms at one kilometer, two, five, nine. No matter how high he ascended, the lights went on and on, sprawling across the land endlessly in all directions with nowhere a break to be seen. Square and featureless forty- and fifty-story buildings stood cheek-to-jowl in endless rows, crowding each other, living in the perpetual shadow of mirrored towers that rose around them to drink the sun. Levels were built upon other levels that had been built upon still others, the moving sidewalks crossed and crisscrossed in patterns of labrynthine intricacy, beneath the surface ran a network of vast subterranean roads where tubetrains and delivery capsules hurdled through the darkness at hundreds of kays per hour, and beneath the roads were basements and sub-basements and tunnels and underways and malls and sub-housing, a whole second city that burrowed as far below the ground as its mirrored sibling ascended above it.

Tuf had seen the lights of the metropolis from the *Ark*; from orbit, the city swallowed half a continent. From the surface, it seemed large enough to swallow galaxies. There were other continents; they, too, blazed by night with the lights of civilization. The sea of light had no islands of darkness within it; the S'uthlamese had no room to spare for luxuries like parks. Tuf did not disapprove; he had always thought parks to be a perverse institution, designed principally to remind civilized humanity how raw and crude and uncomfortable life had been when they had been forced to live it in nature.

Haviland Tuf had sampled a great variety of cultures in his wanderings, and he judged the culture of the S'uthlamese to be inferior to none. It was a world of variety, of dizzying possibilities, of a richness that partook both

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of vitality and decadence. It was a cosmopolitan world, plugged into the network that linked the stars, freely plundering the music, drama, and sensoria imported from other worlds, and using those unceasing stimuli to endlessly transform and mutate its own cultural matrix. The city offered more modes of recreation and more entertainment of more varied sorts than Tuf had ever seen in any one place before, sufficient choices to occupy a tourist for several standard years, if one desired to taste it all.

During his years of travel, Haviland Tuf had seen the advanced science and technological wizardry of Avalon and Newholme, Tober-in-the-Veil, Old Poseidon and Baldur and Arachne and a dozen other worlds out on the sharpened leading edge of human progress. The technology demonstrated on S'uthlam was equal to the most advanced of them. The orbital elevator itself was an impressive feat—Old Earth was supposed to have built such constructs in the ancient days before the Collapse, and Newholme had raised one once, only to have it fall in the war, but nowhere else had Tuf ever observed such a colossal artifact, not even on Avalon itself, where such elevators had been studied and rejected on the grounds of economy. And the sidewalks, the tubetrains, the manufactories, all of it was advanced and efficient. Even the government seemed to work.

S'uthlam was a wonder world.

Haviland Tuf observed it, traveled through it, and sampled its marvels for three days before he returned to his small, cramped, premiere-class sleeping quarters in the seventy-ninth floor of a tower hotel, and summoned the host. "I wish to make arrangements for an immediate return to my ship," he said, seated on the edge of the narrow bed he had summoned from a wall, the chairs being uncomfortably small. He folded large white hands neatly atop his stomach.

The host, a tiny man barely half Tuf's height, seemed nonplussed. "It was my understanding that you were to stay for another ten days," he said.

"That is correct," said Tuf. "Nonetheless, it is the nature of plans to be changed. I wish to return to orbit as soon as is conveniently possible. I would be most grateful if you would see to the arrangements, sir."

"There's so much you haven't seen yet!"

"Indeed. Yet I find that what I have seen, however small a sample of the whole it may be, has been more than sufficient."

"You don't like S'uthlam?"

"It suffers from an excess of S'uthlamese," Haviland Tuf replied. "Several other flaws might also be mentioned." He held up a single long finger. "The food is abysmal, for the most part chemically reformulated, largely without taste, of a distinctly unpleasant texture, full of unusual and disquieting colors. Moreover, the portions are inadequate. I might also be so bold as to mention the constant intrusive presence of a large number of newsfeed reporters. I have learned to recognize them by the multifocus camera they wear in the center of their foreheads as a third eye. Perhaps you have observed them lurking about your lobby, sensorium, and res-

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taurant. By my rough estimate, there seem to be about twenty of them."

"You're a celebrity," the host said, "a public figure. All of S'uthlam is interested in learning about you. Surely, if you don't wish to grant interviews, the peeps haven't dared intrude on your privacy? The ethics of the profession—"

"Have no doubt been observed to the letter," Haviland Tuf finished, "as I must concede that they have kept their distance. Nonetheless, each night when I have returned to this insufficiently large room and accessed the newsfeeds, I have been welcomed by scenes of myself looking over the city, myself eating tasteless rubbery food, myself visiting various scenic tourist attractions, myself entering sanitary facilities. Vanity is one of my great faults, I must confess, but nonetheless the charm of this notoriety quickly palled. Moreover, most of their camera angles have been unflattering in the extreme, and the humor of the newsfeed commentators has bordered on being offensive."

"Easily solved," the host said. "You might have come to me earlier. We can rent you a privacy shield. It clips on the belt, and if any peep approaches within twenty meters, it will jam his third eye and give him a splitting headache."

"Less easily solved," said Tuf impassively, "is the total lack of animal life I have observed."

"Vermin?" the host said, with a horrified look. "You're upset because we have no *vermin?*"

"Not all animals are vermin," said Haviland Tuf. "On many worlds, birds, canines, and other species are kept and cherished. I myself am fond of cats. A truly civilized world preserves a place for the feline, but on S'uthlam it appears the populace would find them indistinguishable from lice and blood-worms. When I made the arrangements for my visit here, Portmaster Tolly Mune assured me that her crew would take care of my cats, and I accepted said assurances. But if indeed no S'uthlamese has ever before encountered an animal of a species other than human, I believe I have just cause to wonder as to the quality of the care they are presently receiving."

"We have animals," the host protested. "Out in the agrifactory zones, plenty of animals. I've seen tapes."

"No doubt you have," said Tuf. "A tape of a cat and a cat, however, are somewhat different things, and require different treatment. Tapes can be stored on a shelf. Cats cannot." He pointed at the host. "These are in the nature of quibbles, however. The crux of the matter, as I have previously mentioned, lies more in the number of S'uthlamese than in their manner. There are too many people, sir. I have been jostled repeatedly on every occasion. In eating establishments, the tables are too close to other tables, the chairs are insufficient to my size, and strangers sometimes seat themselves beside me and pummel me with rude elbows. The seats in theaters and sensoriums are cramped and narrow. The sidewalks are crowded, the lobbies are crowded, the tubes are crowded, there are people everywhere who touch me without my leave or consent."

The host slipped into a polished professional smile. "Ah, humanity!" he said, waxing eloquent. "The glory of S'uthlam! The teeming masses, the

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sea of faces, the endless pagaent, the drama of life! Is there anything quite as invigorating as rubbing shoulders with our fellow man?"

"Perhaps not," said Haviland Tuf flatly. "Yet I find I am now sufficiently invigorated. Furthermore, permit me to point out that the average S'uthlamese is too short to rub against my shoulders, and has therefore been forced to content him- or herself with rubbing up against my arms, legs, and stomach."

The host's smile faded. "You are taking the wrong attitude, sir. To fully appreciate our world, you must learn to see it through S'uthlamese eyes."

"I am unwilling to go about on my knees," said Haviland Tuf.

"You're not anti-life, are you?"

"Indeed not," said Haviland Tuf. "Life is infinitely preferable to its alternative. However, in my experience, all good things can be carried to extremes. This would seem to be the case on S'uthlam." He raised a hand for silence before the host could respond. "More particularly," Tuf continued, "I have developed something of an antipathy, no doubt overhasty and unjustified, to some of the individual specimens of life I have come upon during chance encounters during my travels. A few have even expressed open hostility to me, directing at me epithets clearly derogatory of my size and mass."

"Well," said the host, flushing, "I'm sorry, but you are, uh, ample, and on S'uthlam it is, uh, socially unacceptable to be, uh, overweight."

"Weight, sir, is entirely a function of gravity, and is therefore most malleable. Moreover, I am unwilling to concede you the authority to judge my weight over, under, or just right, these being subjective criteria. Aesthetics vary from world to world, as do genotypes and hereditary predisposition. I am quite satisfied with my present mass, sir. To return to the matter at hand, I wish to terminate my stay immediately."

"Very well," said the host. "I will book passage for you on the first tube-train tomorrow morning."

"This is unsatisfactory. I would prefer to leave at once. I have examined the schedules and discovered a listing for a train in three standard hours."

"Full," snapped the host. "Nothing left on that one but second- and third-class seating."

"I shall endure as best I can," said Haviland Tuf. "No doubt the close press of so much humanity will leave me much invigorated and improved when I depart my train."

Tolly Mune floated in the middle of her office in a lotus position, looking down on Haviland Tuf.

She kept a special chair for flies and groundworms who were unaccustomed to weightlessness. It was a rather uncomfortable chair, all things considered, but it was bolted securely to the deck and equipped with a web-harness to keep its occupant in place. Tuf had pushed over to it with awkward dignity and strapped himself down tightly, and she had settled in comfortably in front of him, at about the level of his head. A man the size of Tuf could not possibly be accustomed to having to look up at anyone during conversation; Tolly Mune figured it gave her a certain psychological edge.

"Portmaster Mune," Tuf said, ap-

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pearing remarkably unfazed by his inferior position, "I must protest. I comprehend that these repeated references to my own person as a fly are merely an instance of colorful local slang with no opprobrium attached. Still, I cannot but take a certain umbrage at this obvious attempt to, shall we say, pull my wings off."

Tolly Mune grinned down at him. "Sorry, Tuf," she said. "Our price is firm."

"Indeed," said Haviland Tuf. "Firm. An interesting word. Were I not awed to be in the mere presence of such an esteemed personage as yourself, and uneasy about giving offense, I might go so far as to suggest that this firmness approaches rigidity. Politeness forebears me from mouthing any statements about greed, avarice, and deepspace piracy in order to further my end of these thorny negotiations. I will point out, however, that the sum of fifty million standards is several times greater than the gross planetary product of a good number of worlds."

"Small worlds," said Tolly Mune, "and this is a large job. You've got one hell of a big ship there."

Tuf remained impassive. "I concede that the *Ark* is indeed a large ship, but fear this has little bearing on matters, unless it is customary for you to charge by the square meter rather than by the hour."

Tolly Mune laughed. "This isn't like fitting some old freighter with a few new pulse-rings or reprogramming your drive navigator. You're talking thousands of hours even with three full crews of spinnerets on triple-shift, you're talking massive systems work by the best cybertechs we've got, you're talking manufacture of custom parts that haven't been used in hundreds of years, and that's just for starts. We'll have to research this damn museum piece of yours before we start ripping it apart, or we'll never be able to get it back together. We'll have to lure some planetside specialists up the elevator, maybe even go out of system. Think of the time, the energy, the calories. The docking fees alone—that thing is *thirty kilometers long, Tuf, you can't get her into the* web. We'll have to build a special dock around her, and even then she'll take up the berths we could have used for three hundred ordinary ships. You don't want to know what it would cost, Tuf." She did some quick figuring on her wrist computer, and shook her head. "If you're here one local month, a real optimistic projection, that's nearly a million cals in docking fees alone. More than three hundred thousand standards in your money, Tuf."

"Indeed," said Haviland Tuf.

Tolly Mune spread her hands helplessly. "If you don't like our price, you could of course take your business elsewhere."

"This suggestion is impractical," said Haviland Tuf. "Unfortunately, as simple as my requests are, it appears that only a handful of worlds possess the expertise to fulfill my requirements, a sad commentary on the present state of human technological prowess."

"Only a handful?" Tolly Mune raised a corner of her mouth. "Perhaps we have priced our services too low."

"Madam," said Haviland Tuf. "Surely you would not be so crass as

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to take advantage of my naive frankness."

"No," she said. "As I said, our price is firm."

"It appears we have reached an embarrassing and knotty impasse. You have your price. I, unfortunately, do not."

"I never would have guessed. A ship like yours, I would have figured you to have calories to burn."

"No doubt I shall soon pursue a lucrative career in the field of ecological engineering," said Haviland Tuf. "Unfortunately, I have not yet commenced my practice, and in my previous trade I had recently suffered some unaccountable financial reverses. Perhaps you would be interested in some excellent plastic reproductions of Cooglish orgy-masks? They make unusual and stimulating wall decorations, and are also said to have certain mystic aphrodisiac properties."

"I'm afraid not," Tolly Mune replied, "but you know what, Tuf? Today is your lucky day."

"I fear you are making light with me," said Haviland Tuf. "Even if you are about to inform me of a half-price sale or two-for-one service special, I am not optimally positioned to take advantage of it. I will be bitterly and brutally candid with you, Portmaster Mune, and admit that I am presently suffering from a temporary inadequacy of funds."

"I have a solution," said Tolly Mune.

"Indeed," said Tuf.

"You're a trader, Tuf. You don't really need a ship as large as the *Ark*, do you? And you know nothing about ecological engineering. This derelict is of no possible good to you. But it does have considerable salvage value." She smiled warmly. "I've talked to the folks downstairs on S'uthlam. The High Council felt it might be in your best interest to sell us your find instead."

"Their concern is touching," said Haviland Tuf.

"We'll pay you a generous salvage fee," she said. "Thirty per cent of the ship's estimated value."

"The estimate to be made by you," said Tuf flatly.

"Yes, but that's not all. We'll toss in a million standards cash, over and above the salvage fee, and we'll give you a new ship. A brand-new Longhaul Nine, the biggest freighter we make, with fully automated kitchen, passenger quarters for six, gravity grid, two shuttles, cargo bays big enough to hold the largest Avalonian and Kimdissi traders side-by-side, triple redundency, the latest Smartalec-series computer, voice-activated, and even a weapons capability if you want one. You'll be the best-equipped independent trader in this whole sector."

"Far be it from me to deprecate such generosity," said Tuf. "The very thought of your offer makes me want to swoon. And yet, though I would no doubt be far more comfortable aboard the handsome new ship you offer me, I have come to have a certain foolish sentimental attachment to the *Ark*. Ruined and useless as it is, it is nonetheless the last remaining seedship of the vanished Ecological Engineering Corps, a living piece of history as it were, a monument to their valor and genius, and yet still not without its small uses. Some time ago, as I made my lonely way across space as best I could, the whim struck

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me to give up the uncertain life of a trader and take up, instead, the profession of ecological engineer. As illogical and no doubt ignorant as this decision was, it still has a certain appeal to me, and I fear that my stubborn nature is a great vice. Therefore, Portmaster Mune, it is with the deepest regret that I must decline your offer. I shall keep the *Ark*."

Tolly Mune gave herself a little twist, spun upside down, and pushed off lightly from the ceiling, so as to come right up into Tuf's face. She pointed a finger at him. "Damn it to hell," she said, "I have no patience with this haggling over every puling calorie, Tuf. I'm a busy woman and I don't have the time or the energy for your trader's games. You're going to sell, I know it and you know it, so let's get this over with. Name your price." She poked his nose lightly with the point of her finger. "Name," poke, "your," poke, "price," poke.

Haviland Tuf unstrapped his harness and kicked off from the floor. He was so huge he made her feel petite, *her*, who'd been called a giant half her life. "Kindly cease your assault upon my person," he said, "it can have no positive benefit upon my decision. I fear you grossly misapprehend me, Portmaster Mune. I have been a trader, true, but a poor one, perhaps because I have never mastered the skill as a haggler which you wrongly impute to me. I have stated my position concisely. The *Ark* is not for sale."

"I have a certain amount of affection for you, from my years upstairs," Josen Rael said crisply over a shielded comlink, "and there's no denying that your record as portmaster has been exemplary. Otherwise I'd remove you right now. You let him get back to his ship? How *could* you? I thought you had better sense than that."

"I thought you were a politician," Tolly Mune said with a certain amount of scorn in her voice. "Josen, think of the goddamned ramifications if I had security grab him in the middle of Spiderhome! Tuf isn't exactly inconspicuous, even when he slips into his silly wig and tries to go incognito. This place is lousy with Vandeeni, Jazbots, Henrys, you name it. All of them watching Tuf and watching the *Ark*, waiting to see what we do. He's already been approached by a goddamned Vandeeni agent. They were observed deep in conversation on the tubetrain."

"I know," the Councilor said unhappily. "Still, something should have . . . you could have had him taken surreptitiously."

"And then what do I do with him?" Tolly Mune said. "Kill him and shove him out an airlock? I won't do that, Josen, and don't even think of having it done for me. If you try it, I'll expose you to the newsfeeds and bring down the whole puling house."

Josen Rael mopped at his sweat. "You're not the only one with principles," he said defensively. "I would not suggest any such thing. Still, we must have that ship, and now that Tuf is back inside it, our task has been made much more difficult. The *Ark* still has formidable defenses. I've had scenarios done, and the odds are good that it might be able to withstand a full-scale assault

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by our entire Planetary Defense Flotilla."

"Oh, puling hell, he's parked a bare five kays beyond the terminus of tube nine, Josen. A goddamned full-scale assault by *anybody* would probably destroy the port and bring down the elevator on top of your puling head! Just hold your bladder, and let me work on this. I'll get him to sell. And I'll do it legally."

"Very well," the Councillor replied. "I'll give you a little more time. But I warn you, the High Council is following the affair closely, and they're impatient. You have three days. If Tuf hasn't thumbed a transfer slip by then, I'm sending up some assault squads."

"Don't worry," said Tolly Mune, "I have a plan."

The communications room of the *Ark* was long and narrow, its walls covered with arrays of blank, dark telescreens. Haviland Tuf had settled in comfortably with his cats; Havoc, the boisterous black-and-white female, was curled up on his legs asleep, while long-haired gray Chaos, scarcely out of his kittenhood, rambled back and forth across Tuf's ample shoulders, rubbing against his neck and purring loudly. Tuf had folded his hands atop his paunch patiently as various computers took his request and reviewed it, relayed it, checked it, transferred it, and cross-indexed it. He had been waiting for some time. When the geometric pavane on the screen finally cleared, he was looking at the typically sharp features of an elderly S'uthlamese woman. "Curator," she announced. "Council databanks."

"I am Haviland Tuf, of the starship *Ark*," he announced.

She smiled. "I recognized you from the newsfeeds. How may I be of help?" She blinked. "Ack, there's something on your neck."

"A kitten, madam," he said. "Quite friendly." He reached up and scratched Chaos under the chin. "I require your assistance in a small matter. As I am but a hopeless slave to my own curiosity, and always eager to improve my meagre store of knowledge, I have recently been occupying myself in the study of your world, its history, customs, folklore, politics, social patterns, and the like. I have of course availed myself of all the standard texts and popular data services, but there is one particular bit of information that I have been hitherto unable to secure. A small thing, truly, no doubt laughably easy to find had I only the wisdom to know where to look, but nonetheless unaccountably absent from all the sources I have checked. In pursuit of this crumb of data, I have contacted the S'uthlam Educational Processing Center and your major planetary library, both of which referred me to you. Thus, here I am."

The Curator's face had grown guarded. "I see. The council databanks are not generally open to the public, but perhaps I can make an exception. What are you looking for?"

Tuf raised a finger. "A single small nubbin of information, as I have said, but I would be in your debt if you would be so kind as to answer my query and salve my burning curiosity. Precisely what is the current population of S'uthlam?"

The woman's face grew cold and

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clouded. "That information is restricted," she said flatly. The screen went black.

Haviland Tuf paused for a moment before plugging back into the data service he had been employing. "I am interested in a general survey of S'uthlamese religion," he told the search program, "and in particular in a description of the beliefs and ethical systems of the Church of Life Evolving."

Some hours later, Tuf was deeply immersed in his text and playing absently with Havoc, who had woken up feisty and hungry, when Tolly Mune's call came through. He stored the information he had been reviewing and summoned her face on another of the room's screens. "Portmaster," he said.

"I hear you're trying to pry into planetary secrets, Tuf," she said, grinning at him.

"I assure you that I had no such intent," Tuf replied, "but in any case, I am a most ineffectual spy, as my attempt was a dismal failure."

"Let's have dinner together," Tolly Mune said, "and maybe I can answer your little question for you."

"Indeed," said Haviland Tuf. "In that case, Portmaster, permit me to invite you to dine aboard the *Ark*. My cuisine, while unexceptionable, is nonetheless more flavorful and considerably more bountiful than the fare available in your port."

"Afraid not," said Tolly Mune. "Too goddamned many duties, Tuf, I can't leave my station. Don't get your guts in an uproar, though, a big freighter just arrived from the Larder. Our farming asteroids, a little in from here, terraformed and fertile as hell. The P.M. gets first grab at the calories. Fresh neograss salads, tunnel-hog ham steaks in brown sugar sauce, spicepods, mushroom bread, jellyfruit in real squirter cream, and beer." She smiled. "*Imported* beer."

"Mushroom bread?" said Haviland Tuf. "I do not eat of animal flesh, but the remainder of your menu sounds most attractive. I shall gladly accept your kind invitation. If you will prepare a dock for my arrival, I will shuttle over in the *Manticore*."

"Use dock four," she said. "Very close to Spiderhome. Is that one Havoc or Chaos?"

"Havoc," Tuf replied. "Chaos has departed on mysterious errands of his own, as cats are wont to do."

"I've never actually seen a live animal," said Tolly Mune cheerfully.

"I shall bring Havoc with me for your elucidation."

"See you soon," Tolly Mune closed.

They dined at one-quarter g.

The Crystal Room clung to the underside of Spiderhome, its exterior a dome of transparent crystalline plasteel. Beyond the all-but-invisible walls of the dome, they were surrounded by the black clarity of space, fields of cool clean stars, and the intricate traceries of the web. Below was the rocky exterior of the station, transport tubes tangled thickly across its surface, the swollen silvery blisters of habitats clinging to nexus points, the sculpted minarets and shining arrow-towers of star class hotels rising into the cold darkness. Directly overhead hung the immense globe of S'uthlam itself, pale blue and brown, aswirl with cloud patterns, the elevator

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hurtling up toward it, higher and higher, until the huge shaft became a thin bright thread and then was lost to the eye entirely. The perspectives were dizzying, and more than a little unsettling.

The room was customarily used only on major state occasions; it had last been opened three years ago, when Josen Rael had come upstairs to entertain a visiting dignitary. But Tolly Mune was pulling out all the stops. The food was prepared by a chef she borrowed for the night from a Transcorp liner; the beer was commandeered from a trader in transit to Henry's World; the service was a rare antique from the Museum of Planetary History; the great ebonfire table, made of gleaming black wood shot through with long scarlet veins, had room enough for twelve; everything was served by a silent, discreet phalanx of waiters in gold and black livery.

Tuf entered cradling his cat, considered the splendor of the table, and gazed up at the stars and the web.

"You can see the *Ark*," Tolly Mune told him. "There, that bright dot, beyond the web to the upper left."

Tuf glanced at it. "Is this effect achieved through three-dimensional projection?" he asked, stroking his cat.

"Hell no. This is the real thing, Tuf." She grinned. "Don't worry, you're safe. That's triple-thick plasteel, neither the world nor the elevator is likely to fall on us, and the chances of the dome's being struck by a meteor are astronomically low."

"I perceive a substantial amount of traffic," said Haviland Tuf. "What are the chances of the dome's being struck by a tourist piloting a rented vacuum sled, a lost circuit-tracer, or a burned-out pulse-ring?"

"Higher," admitted Tolly Mune. "But the instant it happens, the airlocks will seal, claxons will sound, and an emergency cache will spring open. They're required in any structure that fronts on vacuum. Port regs. So in the unlikely event that anything happens, we'll have skinthins, breather pacs, even a laser torch if we want to try and repair the damage before the spinnerets get here. But it's only happened two, three times in all the years there's been a port, so just enjoy the view and don't get too nervous."

"Madam," said Haviland Tuf with ponderous dignity, "I was not nervous, merely curious."

"Right," she agreed. She gestured him to his seat. He folded himself stiffly into it and sat quietly stroking Havoc's black-and-white fur while the waiters brought out appetizer plates and baskets of hot mushroom bread. The savories were of two sorts: tiny pastries stuffed with deviled cheese and mushroom paté, and what appeared to be small snakes, or perhaps large worms, cooked in an aromatic orange sauce. Tuf fed two of the latter to his cat, who devoured them eagerly, before he lifted one of the pastries, sniffed at it, and bit into it delicately. He swallowed and nodded. "Excellent," he pronounced.

"So that's a cat," said Tolly Mune.

"Indeed," replied Tuf, tearing off some mushroom bread—a wisp of steam rose from the interior of the loaf when he broke it open—and methodically slathering it with a thick coating of butter.

Tolly Mune reached for her own

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bread, burning her fingers on the hot crust. But she persisted; it would not do to show any weakness in front of Tuf. "Good," she said, around the first mouthful. She swallowed. "You know, Tuf, this meal we're about to have—most S'uthlamese don't eat this well."

"This fact had not escaped my notice," said Tuf, lifting another snake between thumb and forefinger and holding it out for Havoc, who climbed halfway up his arm to get at it.

"In fact," said Tolly Mune, "the actual caloric content of this meal approximates what the average citizen consumes in a week."

"On the strength of the savories and bread alone, I would venture to suggest that we have already enjoyed more gustatory pleasure than the average S'uthlamese does in a lifetime," Tuf said impassively.

The salad was set before them; Tuf tasted it and pronounced it good. Tolly Mune pushed her own food around on her plate and waited until the waiters had retreated to their stations by the walls. "Tuf," she said, "you had a question, I believe."

Haviland Tuf raised his eyes from his plate and stared at her, his long white face blank and still and expressionless. "Correct," he said. Havoc was looking at her too, from slitted eyes as green as the neograss in their salads.

"Thirty-nine billion," said Tolly Mune in a crisp, quiet voice.

Tuf blinked. "Indeed," he said.

She smiled. "Is that your only comment?"

Tuf glanced up to the swollen globe of S'uthlam overhead. "Since you solicit my opinion, Portmaster, I shall venture to say that while the world above us seems formidably large, I cannot but wonder if it is indeed large enough. Without intending any censure of your mores, culture, and civilization, the thought does occur to me that a population of thirty-nine billion persons might be considered, on the whole, a trifle excessive."

Tolly Mune grinned. "You don't say?" She sat back, summoned a waiter, called for drinks. The beer was thick and brown, with a heavy fragrant head; they served it in huge double-handled mugs of etched glass. She lifted hers a bit awkwardly, watching the liquid slosh about. "The one thing I'll never get used to about gravity," she said. "Liquids ought to be in squeeze bulbs, goddamnit. These seems so damned . . . messy. Like an accident waiting to happen." She sipped, and came away with a foam mustache. "Good, though," she said, wiping her mouth with the back of her hand. "Time to quit this damned fencing, Tuf," she continued as she lowered the mug back to the table with the excessive care of one unaccustomed even to this trace gravity. "You obviously had some suspicion of our population problem, or you would never have inquired after it. And you've been soaking up all kinds of other information. To what end?"

"Curiosity is my sad affliction, madam," Tuf said, "and I sought merely to solve the puzzle that was S'uthlam, with perhaps the vaguest hope that in study I might come across some means of resolving our present impasse."

"And?" Tolly Mune said.

"You have confirmed the assumption

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I was forced to make about your excessive population. With that datum in place, all becomes clear. Your sprawling cities climb ever higher because you must accomodate this swelling population even as you struggle futilely to preserve your agricultural areas from encroachment. Your proud port is impressively busy, and your great elevator moves constantly, because you lack the capacity to feed your own population and must import food from other worlds. You are feared and perhaps even hated by your neighbors because centuries ago you attempted to export your population problem through emigration and annexation, until stopped violently by war. Your people keep no pets because S'uthlam has no room for any nonhuman species that is not a direct, efficient, and necessary link in the food chain. You are on the average distinctly smaller than the human norm due to the rigors of centuries of nutritional deprivation, rationing in all but name, economically enforced. Therefore generation succeeds generation, each smaller and thinner than the last, struggling to subsist on ever diminishing provendar. All these woes are directly attributable to your surfeit of population."

"You don't sound very approving, Tuf," Tolly Mune said.

"I intend no criticism. You are not without your virtues. In the main, you are an industrious, cooperative, ethical, civilized, and ingenious folk; and your society, your technology, and especially your rate of intellectual advance, is much to be admired."

"Our technology," said Tolly Mune drily, "is the only thing that has saved our goddamned asses. We import thirty-four per cent of our raw calories. We grow perhaps another twenty per cent on what agricultural land remains to us. The rest of our food comes out of the food factories, processed from petrochemicals. That percentage goes up every year. Has to. Only the food factories can gear up fast enough to keep pace with the population curve. One goddamned problem, though."

"You are running out of petroleum," ventured Haviland Tuf.

"Damned right we are," said Tolly Mune. "A nonrenewable resource and all that, Tuf."

"Undoubtedly your governing bodies know approximately when the famine will come upon you."

"Twenty-seven standard years," she said. "More or less. The date changes constantly, as various factors are altered. We may get a war before we get famine. That's what some of our experts believe. Or maybe we'll get war *and* famine. Either way we get a lot of dead people. We're a civilized people, Tuf, you said it yourself. So goddamned civilized you wouldn't believe it. Cooperative, ethical, life-affirming, all that bladder-bloat. Even that's breaking down, though. Conditions in the undercities are growing worse, have been for generations, and some of our leaders go so far as to say they're devolving down there, turning into some kind of puling *vermin*. Murder, rape, all the violent crimes, the rates go up each year. Within the past eighteen months, two reports of cannibalism. All that will get a lot worse in years to come. Rising with the puling population curve. You receiving my transmission, Tuf?"

"Indeed," he said impassively.

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The waiters returned, bearing the entrees. Slices of meat were piled high on the platter, still steaming from the oven, and four different types of vegetables were available. Haviland Tuf allowed his plate to be filled to overflowing with spicepods, mashed smackles, sweetroot, and butterknots, and bid the waiter cut several thin slivers of ham for Havoc. Tolly Mune took a thick ham slice herself, and drowned it in brown sauce, but after the first taste she found herself without appetite; she watched Tuf eat. "Well?" she prompted.

"Perhaps I can be of some small service to you in this quandry," Tuf said, deftly spearing a forkful of spicepods.

"You can be a big service to us," Tolly Mune said. "Sell us the *Ark*. It's the only way out, Tuf. You know it. I know it. Name your own price. I appeal to your goddamned sense of morality. Sell, and you'll save millions of lives. Maybe billions. Not only will you be wealthy, you'll be a hero. Say the word and we'll name the goddamned planet after you."

"An interesting notion," said Tuf. "Yet, my vanity notwithstanding, I fear you greatly overestimate the prowess of even the lost Ecological Engineering Corps. In any case the *Ark* is not for sale, as I have already informed you. Perhaps I might venture to suggest an obvious solution to your difficulties? If it proves efficacious, I would be pleased to allow you to name a city or a small asteroid after me."

Tolly Mune laughed. She took a healthy swallow of beer. She needed it. "Go on, Tuf. Say it. Tell me this easy, obvious solution."

"A plethora of terms come to mind," said Tuf. "Population control is the heart of the concept, to be achieved through biochemical or mechanical birth control, sexual abstinence, cultural conditioning, legal prohibitions. The mechanisms may vary, but the end result must be the same. The S'uthlamese must breed at a somewhat diminished rate."

"Impossible," said Tolly Mune.

"That is scarcely so," said Tuf. "Other worlds, vastly older than S'uthlam, have accomplished the same."

"Makes no damned difference," Tolly Mune said. She made a sharp gesture with her mug, and beer sloshed on the table. She ignored it. "You don't win any prizes for original thinking, Tuf. This is anything but a new idea. In fact, we've got a political faction that has been advocating this for, hell, hundreds of years. The zeros, we call 'em. They want to zero out the population curve. I'd say maybe seven, eight percent of the citizenry supports them."

"Mass famine will undoubtedly increase the number of adherents to their cause," Tuf observed, lifting a heavily-laden forkful of mashed smackles. Havoc yowled in approval.

"By then it will be too puling late, and you damn well know it. Problem is, the teeming masses down there really don't believe any such thing is coming, no matter what the politicians say, no matter how many dire predictions they hear over the newsfeeds. *We've heard THAT before*, they say, and damned if they haven't. Grandmother and great grandfather heard similar predictions about famine just around the corner. But S'uthlam has always been able to avoid the catastrophe before. The technocrats

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have stayed on top for centuries by perpetually managing to keep the day of collapse a generation away. They always find a solution. Most citizens are confident they always *will* find a solution."

"Such solutions as you imply are by their very nature only stopgaps," commented Haviland Tuf. "Surely this must be obvious. The only true solution is population control."

"You don't understand us, Tuf. Restrictions against birth are anathema to the vast majority of S'uthlamese. You'll never get any meaningful number of people to accept them, certainly not just to avoid some damned unreal catastrophe that none of them believe in anyway. A few exceptionally stupid and exceptionally idealistic politicians have tried, and they've been dragged down overnight, denounced as immoral, as anti-life."

"I see," said Haviland Tuf. "Are you a woman of strong religious conviction, Portmaster Mune?"

She made a face and drank some more beer. "Hell no. I suppose I'm an agnostic. I don't know, I don't think about it much. But I'm also a zero, though I'd never admit it downstairs. A lot of spinnerets are zeros. In a small closed system like the port, the effects of unrestrained breeding soon become damned apparent, and damned scary. Downstairs, it's not so puling clear. And the church . . . are you familiar with the Church of Life Evolving?"

"I have a certain cursory familiarity with its precepts," Tuf said, "of admittedly recent acquisition."

"S'uthlam was *settled* by the elders of the Church of Life Evolving," Tolly Mune said. "They were escaping from religious persecution on Tara, and they were persecuted because they bred so damned fast they were threatening to take over the planet, which the rest of the Tarans didn't much like."

"An understandable sentiment," said Tuf.

"Same damned thing killed the colonization program the expansionists launched a few centuries back. The church—well, its fundamental belief is that the destiny of sentient life is to fill up the universe, that life is the ultimate good and anti-life, entropy, the ultimate evil; that life and anti-life are in a kind of race. We must evolve, the church says, evolve through higher and higher states of sentience and genius into eventual godhood, and we must achieve that godhood in time to avert the heat-death of the universe. Since evolution operates through the biological mechanism of breeding, we must therefore breed, must ever expand and enrich the genepool, must spread our seed to the stars. To restrict birth . . . we might be interfering with the next step in human evolution, might be aborting a genius, a proto-god, the carrier of the one mutant chromosome that would pull the race up to the next, transcendant rung on the ladder."

"I believe I grasp the essentials of the credo," Tuf said.

"We're a free people, Tuf," Tolly Mune said. "Religious diversity, freedom of choice, all that. We've got Erikaners, Old Christers, Children of the Dreamer. We've got Steel Angel bastions and we've got Melder communes, anything you want. But more than eighty per cent of the population still

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belong to the Church of Life Evolving, and if anything, their beliefs are stronger now than they've ever been. They look around, and they see all the obvious fruits of the church's teachings. When you've got billions of people, you've got millions at genius level, and you've got the stimulus of virulent cross-fertilization, of savage competition for advancement, of incredible need. So —puling hell, it's only logical—S'uthlam has achieved miraculous technological breakthroughs. They see our cities, our elevator, they see the visitors coming from a hundred worlds to study here, they see us eclipsing all the neighboring worlds; and they *don't* see a catastrophe, and the church leaders say every*thing will be fine, so why the bloody* hell should anybody stop breeding!" She slapped the table hard, turned to a waiter. "You!" she snapped. "More beer. And quick." She turned back to face Tuf. "So don't give me these naive suggestions. Birth restrictions are utterly infeasible given our situation. Impossible. You understand that, Tuf?"

"There is no need to impugn my intelligence," said Haviland Tuf. He stroked Havoc, who had settled into his lap, surfeit with ham. "The plight of S'uthlam has touched my heart. I shall endeavor to do what I can to relieve your world's distress."

"You'll sell us the *Ark*, then?" she said sharply.

"This is an unwarranted assumption," Tuf replied. "Yet I shall certainly do what I can in my capacity as an ecological engineer, before moving on to other worlds."

The waiters were bringing out the dessert, fat blue-green jellyfruit swimming in bowls of thickened, clotted cream. Havoc sniffed the cream and leapt up on to the table for a closer investigation as Haviland Tuf lifted the long silver spoon they had provided him.

Tolly Mune shook her head. "Take it away," she snapped, "too damn rich. Just beer for me."

Tuf looked up and raised a finger. "A moment! No use in letting your portion of this delightful confection go to waste. Havoc will surely enjoy it."

The Portmaster sipped a fresh mug of brown beer, and scowled. "I've run out of things to say, Tuf. We have a crisis here. We must have that ship. This is your last chance. Will you sell?"

Tuf looked at her. Havoc moved in quickly on the dessert. "My position is unchanged."

"I'm sorry, then," Tolly Mune said. "I didn't want to do this." She snapped her fingers; in the quiet of that moment, when the only sound was Havoc lapping at the clotted cream, the noise was like a gunshot. All around the clear crystalline walls, the tall, attentive waiters reached beneath their snug gold-and-black jackets and produced nerveguns.

Tuf blinked, and moved his head first right, then left, studying each man in turn while Havoc plundered his jellyfruit. "Treachery," he said flatly. "I am gravely disappointed. My trust and good nature have been ill used."

"You forced my hand. Tuf, you damned fool—"

"Such rank abuse exacerbates this betrayal rather than justifying it," said Tuf, with spoon in hand. "Am I now to be secretly and villainously slain?"

"We're civilized people," Tolly Mune

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said angrily, furious at Tuf, at Josen Rael, at the goddamned Church of Life Evolving, and mostly at herself for letting it come to this. "No, you won't be killed. We won't even steal that goddamned derelict of a ship you care so damned much about. This is all legal, Tuf. You're under arrest."

"Indeed," said Tuf. "Please accept my surrender. I am always anxious to comply with all pertinent local laws. On what charge am I to be tried?"

Tolly Mune smiled thinly, without joy, knowing full well they'd be calling her the Steel Widow in Spiderhome tonight. She pointed down to the far end of the table, where Havoc sat licking cream off her whiskers. "Bringing illegal vermin into the Port of S'uthlam," she said.

Tuf laid down his spoon carefully and folded his hands atop his paunch. "It is my recollection that I brought Havoc here with me on your specific invitation."

Tolly Mune shook her head. "Won't wash, Tuf. I've got our talk recorded. True, I observed that I'd never seen a live animal before, but that's a simple factual declaration, and no court could possibly construe it as an incitement for you to commit a criminal violation of our health statutes. No court of ours, anyway." Her smile was almost apologetic.

"I see," said Tuf. "In that case, let us dispense with time-consuming legal machinations. I will plead guilty and pay the prescribed fine for this minor infraction."

"Good," said Tolly Mune. "The fine is fifty standards." She gestured, and one of her men strode forward and gathered up Havoc from the table. "Of course," she finished, "the vermin in question must be destroyed."

"I hate gravity," Tolly Mune said to Josen Rael's smiling, magnified face after she'd finished her report on the dinner. "It exhausts me, and I hate to think what all that goddamned *drag* does to my muscles, my internal organs. How can you worms live that way? And all that puling food! It was obscene the way he put it away, and the *smells* . . ."

"Portmaster, we have more important things to discuss," Rael said. "It's done, then? We have him?"

"We have his cat," she said glumly. "More precisely, *I* have his goddamned cat." As if on cue, Havoc yowled, and pressed her face against the meshwork plasteel cage that the security men had rigged up in a corner of her apartment. The cat yowled a lot; it was distinctly uncomfortable in weightlessness, and kept spinning out of control when it tried to move. Every time it caromed off the side of the cage, Tolly Mune winced with guilt. "I was sure he'd thumb the transfer to save the puling cat."

Josen Rael looked upset. "I can't say I think much of your plan, Portmaster. Why in the name of life would anyone surrender a treasure the magnitude of this *Ark* to preserve an animal specimen? Especially since you tell me he has other samples of the same type of vermin back aboard his craft?"

"Because he's got an emotional attachment to this particular vermin," Tolly Mune said, with a sigh. "Except that Tuf is even cagier than I thought. He called my bluff."

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"Destroy the vermin, then. Show him we mean what we say."

"Oh, be sane, Josen!" she replied impatiently. "Where does that leave us? If I go ahead and kill the damned cat, then I've got nothing. Tuf knows that, and he knows that I know that, and he knows that I know that he knows. At least this way, we've got something he wants. We're stalemated."

"We'll change the law," Josen Rael suggested. "Let me . . . yes, the penalty for smuggling vermin into port should include confiscation of the ship used for the smuggling!"

"A goddamned masterstroke," said Tolly Mune. "Too bad the charter prohibits retroactive laws."

"I have yet to hear a better plan from you."

"That's because I don't have one yet, Josen. But I will. I'll argue him out of it. I'll swindle him out of it. We know he's got weaknesses. Food, his cats. Maybe there's something else, something we can use. A conscience, a libido, a weakness for drink, for gambling." She paused, thoughtful. "Gambling," she repeated. "Right. He likes to play games." She pointed a finger at the screen. "Stay out of it. You gave me three days, and my time's not up yet. So hold your bladder." She wiped his features off the huge vidscreen, and replaced them with the darkness of space, with the *Ark* floating against a field of unwinking stars.

The cat somehow seemed to recognize the image up on the screen, and made a thin, plaintive mewing sound. Tolly Mune looked over, frowned, and asked to be put through to her security monitor. "Tuf," she barked, "where is he now?"

"In the Worldview Hotel star-class gaming salon, Ma," the woman on duty responded.

"The Worldview?" she groaned. "He would pick a goddamned worm palace, wouldn't he? What's that under, full g? Oh, puling hell, never mind. Just see that he stays there. I'm coming down."

She found him playing five-sided quandry against a couple of elderly groundworms, a cybertech she had had suspended for systems-looting a few weeks back, and a moon-faced, fleshy trade negotiator from Jazbo. Judging from the mountain of counters stacked in front of him, Tuf was winning handily. She snapped her fingers, and the salon hostess came gliding over with a chair. Tolly Mune sat herself next to Tuf and touched him lightly on the arm. "Tuf," she said.

He turned his head and pulled away from her. "Kindly refrain from laying hands upon my person, Portmaster Mune."

She pulled her hand back. "What are you doing, Tuf?"

"At the moment, I am assaying an interesting new strategem of my own devising against Negotiator Dez. I fear it will be proved unsound, but we shall see. In a larger sense, I strive to earn a few meagre standards through the application of statistical analysis and applied psychology. S'uthlam is by no means inexpensive, Portmaster Mune."

The Jazboite, his long hair gleaming with iridescent oils, his fat face covered with rank-scars, laughed roughly and

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displayed a mouth of polished black teeth inset with tiny crimson jewels. "I challenge, Tuf," he said, touching a button underneath his station to flash his array upon the lighted surface of the table.

Tuf leaned forward briefly. "Indeed," he said. A long pale finger moved appropriately, and his own formation lit up within the gaming circle. "I fear you are lost, sir. My experiment has been proven successful, though no doubt by mere fluke."

"Blast you and your damnable luck!" the Jazboite said, lurching unsteadily to his feet. More counters changed hands.

"So you game well," Tolly Mune said to him. "It won't do you a damned bit of good, Tuf. The odds in these places favor the house. You'll never gamble your way to the money you need."

"I am not unaware of this," Tuf replied.

"Let's talk."

"We are engaged in talking at this very moment."

"Let's talk *privately*," she stressed.

"During our last private discussion, I was set upon by men with nerveguns, verbally pummeled, cruelly deceived, deprived of a beloved companion, and denied the opportunity to enjoy dessert. I am not favorably predisposed to accept further invitations."

"I'll buy you a drink," said Tolly Mune.

"Very well," said Tuf. He rose ponderously, scooped up his counters, and bid farewell to the other players. The two of them walked to a privacy booth on the far side of the gaming room, Tolly Mune puffing a bit from the strain of fighting gravity. Once inside, she slumped into the cushions, ordered iced narcoblasts for two and opaqued the curtain.

"The ingestion of narcotic beverages will have scant effect on my decision-making capacities, Portmaster Mune," said Haviland Tuf, "and while I am willing to accept your largesse as a token of redress for your earlier perversion of civilized hospitality, my position is nonetheless unchanged."

"What do you want, Tuf?" she said wearily, after the drinks had come. The tall glasses were rimed with frost, the liquor cobalt blue and icy.

"Like all of humanity, I have many desires. At the moment I most urgently wish the safe return of Havoc to my custody."

"I told you, I'll swap the cat for the ship."

"We have discussed this proposal, and I have rejected it as inequitable. Must we go over the same ground again?"

"I have a new argument," she said.

"Indeed." Tuf sipped at his drink.

"Consider the question of ownership, Tuf. By what right do you own the *Ark*? Did you build it? Did you have any role in its creation? Hell no."

"I found it," said Tuf. "True, this discovery was made in the company of five others, and it cannot be denied that their claims to ownership were, in some cases, superior to my own. They, however, are dead, and I am alive. This strengthens my claim considerably. Moreover, I presently possess the artifact in question. In many ethical systems, possession is the key, indeed oft-

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times the overriding, determinant of ownership."

"There are worlds where the state owns everything of value, where your goddamned ship would have been seized out of hand."

"I am mindful of this and purposefully avoided such worlds when choosing my destination," said Haviland Tuf.

"We could take your damned ship by force if we wanted, Tuf. Maybe it's power that conveys ownership, eh?"

"It is true that you command the fierce loyalty of numerous lackies armed with nerveguns and lasers, while I am alone, a humble trader and neophyte ecological engineer, companioned only by his harmless cats. Nonetheless, I am not without certain small resources of my own. It is theoretically possible for me to have programmed defenses into the *Ark* that would make such a seizure perhaps less easily accomplished than you imagine. Of course this supposition is entirely hypothetical, but you might do well to give it due consideration. In any case brutal military action would be illegal under the laws of S'uthlam."

Tolly Mune sighed. "Some cultures hold that utility confers ownership. Others opt for need."

"I am not unfamiliar with these doctrines."

"Good. S'uthlam needs the *Ark* more than you do, Tuf."

"Incorrect..I have need of the *Ark* to pursue my chosen profession and earn a livelihood. Your world has no need of the ship itself, but rather of ecological engineering. Therefore I have offered you my services, only to find my generous offer spurned and dubbed insufficient."

"Utility," Tolly Mune interrupted. "We have a whole goddamned world of brilliant scientists. You're nothing but a trader, by your own admission. We can make better use of the *Ark*."

"Your brilliant scientists are largely specialists in physics, chemistry, cybernetics, and other like fields. S'uthlam is not especially advanced in the areas of biology, genetics, or ecology. This is doubly obvious. If you possessed such expertise as you imply, firstly, your need for the *Ark* would not be as urgent, and secondly, your ecological problem would never have been allowed to reach its present ominous proportions. Therefore I question your assertion that your people would put the ship to more efficient use. Since coming upon the *Ark* and commencing my voyage here, I have dutifully immersed myself in study, and I would be so bold as to suggest that I am now the single most qualified ecological engineer in human space, possibly excluding the planet Prometheus."

Haviland Tuf's long white face was without expression; he shaped each pronouncement carefully and fired them at her in cool salvos. Yet, unflappable as he was, Tolly Mune sensed that behind Tuf's calm facade was a weakness; pride, ego, a vanity she could twist to her own ends. She jabbed a finger at his face. "Words, Tuf. Nothing but puling empty words. You can call yourself an ecological engineer but that doesn't mean a damned thing. You can call yourself a jellyfruit, but you'd still look damned silly squatting in a bowl of clotted cream!"

"Indeed," Tuf said.

"I'll make you a wager," she said,

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going for the kill, "that you don't know what the hell you're doing with that damned ship."

Haviland Tuf blinked, and made a steeple with his hands on the table. "This is an interesting proposition," he said. "Continue."

Tolly Mune smiled. "Your cat against your ship," she said. "I've described our problem. Solve it, and you get back Havoc, safe and sound. Fail, and we get the *Ark*."

Tuf raised a finger. "This scheme is flawed. Although you set me a formidable task, I am not loath to accept such a challenge were the suggested stakes not so imbalanced. The *Ark* and Havoc are both mine, though you have unscrupulously albeit legally seized custody of the latter. Therefore it appears that by winning, I simply get back that which is rightfully mine to begin with, whereas you stand to gain a great prize. This is inequitable. I have a counter offer. I came to S'uthlam for certain repairs and alterations. In the event of my success, let this work be performed without cost to me."

Tolly Mune lifted her drink to her mouth to give herself a moment to consider. The ice had turned slushy, but the narcoblaster still had a nice sting to it. "Fifty million standards of free repairs? That's too damn much."

"Such was my opinion," said Tuf.

She grinned. "The cat," she said, "may have been yours to start with, but now she's ours. But I'll go this far on the repairs, Tuf—I'll give you credit."

"On what terms and at what interest rate?" Tuf asked.

"We'll do the refitting," she said, smiling. "We'll start immediately. If you win—which you won't—you get the cat back, and we'll give you an interest-free loan for the cost of the repair bill. You can pay us off from the money you make out there"—she waved vaguely toward the rest of the universe—"doing your damned eco-engineering. But we get a lien on the *Ark*. If you haven't paid half the money back in five standard years, or all of it in ten, the ship is ours."

"The original estimate of fifty million standards was excessive," Tuf said, "obviously an inflated figure intended solely to force me to sell you my ship. I suggest we settle on a sum of twenty million standards as the basis for this agreement."

"Ridiculous," she snapped. "My spinnerets couldn't even *paint* your goddamned ship for twenty million standards. But I'll go down to forty-five."

"Twenty-five million," Tuf suggested. "As I am alone aboard the *Ark*, it is not strictly necessary that all decks and systems be restored to full optimal function. A few distant, dysfunctional decks are of no ultimate importance. I will trim my work order to include only the repairs that must be made for my safety, comfort, and convenience."

"Fair enough," she said. "I'll go to forty million."

"Thirty," Tuf insisted, "would seem more than enough."

"Let's not quibble over a few million standards," said Tolly Mune. "You're going to lose, so it doesn't matter one hot damn."

"I have a somewhat different viewpoint. Thirty million."

"Thirty-seven," she said.

"Thirty-two," Tuf replied.

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"Obviously, we're going to settle on thirty-five, right? Done!" She stuck out her hand.

Tuf looked at it. "Thirty-four," he said calmly.

Tolly Mune laughed, withdrew her hand, and said, "What does it matter? Thirty-four."

Haviland Tuf stood up.

"Have another drink," she said, gesturing. "To our little wager."

"I fear I must decline," Tuf said. "I will celebrate after I have won. For the nonce, there is work to do."

"I cannot believe you've done this," Josen Rael said, very loudly. Tolly Mune had turned the volume up high on her com unit, to drown out the constant irritating protests of her captive cat.

"Give me a little sanity, Josen," she said querulously. "This is goddamned brilliant."

"You've *bet* the future of our world! Billions and billions of lives! Do you seriously expect me to honor this little pact of yours?"

Tolly Mune sucked on her beer bulb and sighed. Then, in the same voice she would have used to explain things to an especially slow child, she said, "We *can't lose,* Josen. Think about it, if that wormy thing in your skull isn't too atrophied by gravity to be capable of thought. Why the hell did we want the *Ark*? To feed ourselves, of course. To avoid the famine, to solve the problem, to work a puling biological miracle. To multiply the loaves and fishes."

"Loaves and fishes?" the First Councillor said, baffled.

"Times infinity. It's a classical allusion, Josen. Christian, I think. Tuf is going to take a try at making fish sandwiches for thirty billion. I think he'll just get flour on his face and choke on a fish bone, but that doesn't matter. If he fails, we get the goddamned seedship, all nice and legal. If he succeeds, we don't *need* the *Ark* any more. We win either way. And the way I got things rigged, even if Tuf does win, he'll still owe us thirty-four million standards. If by some miracle he pulls it off, odds are we'll get the ship anyway, when he comes up short on his damned note." She drank some more beer and grinned at him. "Josen, you're damned lucky I don't want your job. Has it ever dawned on you that I'm a lot smarter than you?"

"You're a lot less politic too, Ma," he said, "and I doubt you'd last a day in my job. I can't deny that you do yours well, however. I suppose your plan is viable."

"You *suppose?*" she said.

"There are political realities to consider. The expansionists want the ship itself, you must realize, against the day they regain power. Fortunately, they are a minority. We'll outvote them in council once again."

"See that you do, Josen," Tolly Mune said. She broke the connection and sat floating in the dimness of her home. On her vidscreen, the *Ark* came into view again. Her work crews were all over it now, jury-rigging a temporary dock. Permanence would come later; she expected the *Ark* to be around for a good few centuries, so they needed a place to keep the damned thing, and even if Tuf did make off with it by some freakish chance, a major expansion of

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the web was long overdue and would provide new docking facilities of hundreds of ships. With Tuf paying the bill, she saw no sense in postponing the construction any longer. A long translucent plasteel tube was being assembled, section by section, to link the huge seedship to the end of the nearest major spur so shipments of materials and teams of spinnerets could reach it more easily. Cybertechs were already inside, linked to the ship's computer system, reprogramming to suit Tuf's requirements—and incidentally dismantling any internal defenses he might have coded in. Secret orders from the Steel Widow herself; Tuf didn't know. Just a little extra precaution in case he was a poor loser. She didn't want any monsters or plagues popping out of her prize box when she opened it.

As for Tuf, her sources said he had been in his own computer room almost continuously since leaving the Worldview's gaming salon. On her authority as Portmaster, the council databanks had been authorized to give him whatever information he required, and he certainly required a great deal, from the reports she was getting. He had the *Ark*'s own computers data-storming extensive series of projections and simulations. Tolly Mune had to give him credit; he was giving it his best.

The cage in the corner thumped as Havoc crashed against its side and gave out a small, hurt mew. She felt sorry for the cat. She felt sorry for Tuf too. Maybe, when he failed, she'd see if she couldn't get him that Longhaul Nine anyway.

Forty-seven days passed.

Forty-seven days passed with the work crews working triple shift, so the activity around the *Ark* was constant, unrelenting, and frenetic. The web crawled out to the seedship and covered it; cables snaked around it like vines, a network of pneumatic tubes plunged in and out of its airlocks as if it were a dying man in a downstairs medcenter, plasteel bubbles swelled out on its hull like fat silver pimples, tendrils of steel and duralloy crisscrossed it like veins, vacuum sleds buzzed about its immensity like stinging insects trailing fire, and everywhere, inside and out, walked platoons of spinnerets. Forty-seven days passed and the *Ark* was repaired, refinished, modernized, restocked.

Forty-seven days passed without Haviland Tuf's leaving his ship for so much as a minute. At first he lived in his computer room, the spinnerets reported, with the simulations running day and night and the data crashing in all around him. These past few weeks he had most often been seen riding in a small three-wheeled cart down the thirty-kilometer length of the seedship's huge central shaft, a green duck-billed cap perched atop his head, a small long-haired gray cat in his lap. He took only scant and perfunctory notice of the S'uthlamese workers, but at intervals he would pull over to recalibrate instrumentation at scattered random work stations or check the endless series of vats, large and small, that lined those towering walls. The cybertechs noticed that certain cloning programs were up and running, and that the chronowarp had been engaged, drawing off enormous amounts of energy. Forty-seven days passed with Tuf in near seclusion, companioned only by Chaos, working.

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Forty-seven days passed during which Tolly Mune talked neither to Tuf nor to First Councillor Josen Rael. Her duties as Portmaster, neglected during the onset of the *Ark* crisis, were more than sufficient to keep her occupied. She had disputes to hear and adjudicate, promotions to review, construction to supervise, beribboned fly diplomats to entertain before flushing them down the elevator, budgets to draw up, payrolls to thumb. And she had a cat to deal with too.

At first, Tolly Mune feared the worst. Havoc refused to eat, seemed unable to reconcile herself to weightlessless, fouled the air in the Portmaster's apartment with her waste products, and insisted on making some of the most pitiful noises the Portmaster had ever had the misfortune to hear. She got worried enough to bring in her chief verminologist, who assured her that the cage was spacious enough and the portions of protein paste were more than adequate. The she-cat did not agree, and continued to sicken, mewing and hissing until Tolly Mune was certain that insanity, either feline or human, was just around the corner.

Finally she took steps. She discarded the nutritious protein paste and began to feed the creature with the meat-sticks Tuf had sent over from the *Ark*. The ferocity with which Havoc attacked them when she thrust the ends through the bars was reassuring. Once she licked at Tolly Mune's fingers after consuming a stick in record time; it was a strange sensation, but not entirely unpleasant. The cat took to rubbing up against the cage too, as if she wanted contact; Tolly touched her tentatively, and was repaid with a far more pleasant sound than the cat had uttered previously. The touch of the creature's black-and-white fur was almost sensuous.

After eight days, she let it out of its cage. The larger confines of the office would be a sufficient prison, she thought. No sooner did Tolly Mune slide back the cage door than Havoc bounded through, but when the bound took her sailing clear across the room, she began hissing wildly in distress. Tolly kicked off after her and snatched her as she tumbled, but the cat struggled wildly, clawing long gashes down the backs of her hands. After the medtech had come and gone, Tolly Mune called through to security. "Requisition a room in the Worldview," she said, "a tower room with gravity control. Tell them to set the grid for one quarter-g."

"Who's the guest?" they asked her.

"A port prisoner," she snapped, "armed and dangerous."

After the move, she visited the hotel daily at the end of her work-shift, at first strictly to feed her hostage and check on its welfare. By the fifteenth day, she was lingering long enough to soak up a few calories and give the cat the contact it craved. The beast's personality had changed dramatically. It made sounds of pleasure when she opened the door for her daily inspection (although it still tried constantly to escape), rubbed up against her leg without provocation, kept its claws sheathed, and even seemed to be growing fat. Whenever Tolly Mune permitted herself to sit, Havoc was in her lap instantly. On the twentieth day she slept over. On the twenty-sixth she moved in temporarily.

Forty-seven days passed, and by the

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end of them Havoc had grown accustomed to sleeping next to her, curled up on her pillow, her soft black-and-white fur brushing against the Portmaster's cheek.

On the forty-eighth day, Haviland Tuf called. If he was shocked to see his cat nestled in her lap, he gave no sign. "Portmaster Mune," he said.

"Give up yet?" she asked him.

"Scarcely," Tuf replied. "In point of fact, I stand ready to claim my victory."

It was too important a meeting for a tele-link, even a shielded tele-link, Josen Rael had ruled. The Vandeeni might have ways of penetrating the shields. And yet, because Tolly Mune had dealt with Tuf first-hand and might understand him in a way the council could not, her presence was imperative, and her aversion to gravity was considered unimportant. She took the elevator down to the surface, for the first time in more years than she cared to contemplate, and was whisked by aircab to the highest chamber atop the council tower.

The huge drafty room had a certain spartan dignity. It was dominated by a long, wide conference table with a mirror-bright monitor-top. Josen Rael sat in the position of authority, in a high-backed black chair with the globe of S'uthlam worked in three-dimensional relief above his head. "Portmaster Mune," he said, nodding to her as she struggled to an unoccupied seat near the foot of the table. The room was crowded with the powerful: the inner council, the elite of the technocratic faction, key bureaucrats. Half her life had passed since the last time she had been summoned downstairs, but Tolly Mune watched the newsfeeds, and recognized many of those present. The young councilor for agriculture, surrounded by under-councilors, his assistants for botantical research, oceanic development, food processing. The councilor for war and his cyborg tactician. The transport administrator. The curator of the databanks and her chief analyst. The councilors for internal security, science and technology, interstellar relations, industry. The commander of the Planetary Defense Flotilla. The senior officer of the world-police. They all nodded at her blankly.

To his credit, Josen Rael dispensed with all formality. "You've had a week with Tuf's projections and the seedstock and samples he provided us," he said to his council. "Well?"

"It's difficult to judge with any degree of accuracy," said the data analyst. "His projections may be right on target or they may be completely wrong, based on mistaken assumptions. I can't begin to check for accuracy until, well, I'd say it will take several plantings at least, several years. These things Tuf has cloned for us, these plants and animals and the like, all of them are new to S'uthlam. Until we have some hard experience with them, to determine how they will flourish under S'uthlamese conditions, we can't be certain how much of a difference they'll make."

"If any," said the councilor for internal security, a short square brick of a woman.

"If any," echoed the analyst.

"You're being much too conservative," the councilor for agriculture interrupted. He was the youngest man in

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the room, brash and outspoken, and at the moment his smile looked as though it might crack his thin face clean in two. "My reports are all positively *glowing*." He had a tall pile of crystal data-chips on the conference table in front of him. He spread them out and shoved one into a port on his station; lines of readout began to scroll down the mirrored table-top, below the polished surface. "This is our analysis of the thing he calls omni-grain," the councillor said. "Incredible, really incredible. A gene-tailored hybrid, completely edible. *Completely edible*, councilors, every part of the plant. The stalks grow waist high, like neograss, very high in carbohydrates, crunchy texture, not at all bad with a little dressing, but primarily useful as fodder for food animals. The heads yield an excellent cereal grain with a better food-to-chaff ratio than nanowheat or s'rice. The yield is easy to transport, stores forever without refrigeration, is impossible to bruise, and high in protein. And the roots are edible tubers! Not only that, but it grows so damn fast that it will give us twice as many crops per season. Just guesswork, of course, but I estimate that if we plant omni-grain on the kays we've got alloted to nanowheat, neograss, and s'rice, we'll reap three, four times the calories from the same plots."

"It must have some disadvantages," Josen Rael objected. "It sounds too good to be true. If this omni-grain is so perfect, why haven't we heard of it before? Tuf certainly didn't gene-splice it together in these past few months."

"Of course not. It's been around for centuries. I found a reference to it in the databanks, believe it or not. It was developed by the EEC during the war, as military fodder. The stuff grows so quickly that it's ideal when you're not sure whether you'll be reaping the crops you're sowing or fertilizing them, ah, personally. But it was never adapted by civilians. The taste was considered inferior. Not awful or unpleasant, you understand, just inferior to existing grains. Also, it exhausts the soil in a very short time."

"Aha," said the councillor for internal security. "So it's a trap of sorts?"

"By itself, yes. You'd get maybe five years of bountiful crops and then disaster. But Tuf has also sent along some vermin, incredible things, super-worms and other aerators, and a symbiote, a kind of slime-mold that will grow together with the omni-grain without harming it, living off—get this now—living off *air pollution* and certain kinds of useless petrochemical waste, and using that to restore and enrich the soil." He threw up his hands. "It's an incredible breakthrough! If our own research teams had developed this, we'd have already declared a holiday."

"What about the other things?" Josen Rael asked curtly. The First Councillor's face did not reflect any of the enthusiasm of his subordinate.

"Almost as exciting," was the reply. "The oceans, we've *never* been able to get a decent caloric yield from the oceans, relative to their size, and the last administration practically fished them to extinction with their sea-sweepers. Tuf is giving us a dozen new sorts of fast-breeding fish, and a variety of plankton . . ." He fished around in front of him, found another data-chip, plugged it in. "Here, this plankton, it

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will gum up the sea lanes, certainly, but ninety per cent of our commerce is subsurface or airborne, so it doesn't matter. The fish will thrive on it, and under the right conditions the plankton itself will grow so thick it will cover the water to a depth of three meters, like some vast gray-green carpet."

"An alarming prospect," said the councilor for war. "Is it edible? By humans, I mean."

"No." The agri-councilor grinned. "But when it's dead and decaying, it will serve admirably as a raw material for our food factories once the petroleum runs out."

All the way down at the far end of the table, Tolly Mune laughed loudly. Heads turned to face her. "I'll be damned," she said. "He gave us loaves and fishes after all."

"The plankton's not really a fish," the councillor said.

"If it lives in the goddamned ocean, it's a puling fish as far as I'm concerned."

"Loaves and fishes?" asked the councilor for industry.

"Go on with your report," Josen Rael said impatiently. "Was there anything else?"

There was. There was a nutritious lichen that would grow on the highest mountains, and another that could survive even in airless conditions under hard radiation. "More Larder asteroids," announced the agricultural councilor, "without having to spend decades and billions of cals terraforming." There were parasitic food-vines that would infest S'uthlam's steamy equatorial swamps and gradually choke out and displace the fragrant and poisonous native forms that now grew there in profusion. There was a grain called snow-oats that would grow on frozen tundra, and tunnel-tubers that could honeycomb even the frozen earth beneath a glacier with huge airy passages walled by buttery brown nut-meat. There were genetically improved cattle, pigs, fowl, fish, there was a new bird that Tuf claimed would eliminate the leading S'uthlamese agricultural pest, and there were seventy-nine new varieties of edible mushroom and fungus that could be raised in the darkness of the undercities and nourished with human waste products.

And when the councilor had finished his report, there was silence.

"He's won," Tolly Mune said, grinning. The rest were all deferring to Josen Rael, but she was damned if she was going to sit and play politics. "I'll be damned, Tuf actually did it."

"We do not know that," said the databanks curator.

"It will be years before we have meaningful statistics," said the analyst.

"There may be a trap," warned the councilor for war. "We must be cautious."

"Oh, to hell with that," said Tolly Mune. "Tuf has proved that—"

"*Portmaster*," interrupted Josen Rael, very sharply.

Tolly Mune closed her mouth; she had never heard him use that tone before. The others looked at him as well.

Josen Rael took out a cloth and mopped the perspiration from his brow. "What Haviland Tuf has proven, beyond any doubt, is that the *Ark* is far too valuable for us to even consider letting it go. We will now discuss how best to seize it, while minimizing the

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loss of life and the diplomatic repercussions." He called upon the councillor for internal security.

Portmaster Tolly Mune listened quietly to her report, and sat through an hour of the discussion that followed, while they argued about tactics and the proper diplomatic stance and the most efficient utilization of the seedship and which department ought to take charge of it and what to say to the newsfeeds. The discussion promised to last half the night, but Josen Rael said firmly that they would not break until the whole affair had been settled to the last jot and tittle. Food was ordered, records were sent for, subordinates and specialists were summoned and dismissed. Josen Rael gave orders that they were not to be interrupted for any reason whatsoever. Tolly Mune listened. Finally, she got unsteadily to her feet. "Sorry," she apologized, "it's . . . it's the puling gravity, not used to it, where's the nearest sani . . . sanitary . . . ulp."

"Of course, Portmaster," said Josen Rael. "Outside, the left corridor, fourth door down."

"Thank you," she said. They resumed talking as Tolly Mune staggered outside. She could hear their droning through the door. There was one police guard. She nodded to him, walked off briskly, and turned right.

Once out of his sight, she began to run.

On the roofdeck she commandeered an aircab. "The elevator," she snapped, "and scream it." She showed him her priority band.

A train was just about to leave. It was full. She bumped a star-class passenger. "Emergency in the web," she said. "I have to get back in a hurry." They made a record ascent, since after all she was Ma Spider, and transportation was waiting in Spiderhome to whisk her to her quarters.

She sailed in, sealed the door, turned on her com, coded it to transmit a recording of her deputy's face, and tried to punch through to Josen Rael. "I'm sorry," the computer said with cybernetic sympathy. "He's in meeting, and cannot be interrupted at this time. Would you care to leave a message?"

"No," she said. She sent her own image when she punched through to her foreman out on the *Ark*. "How are things floating, Frakker?"

He looked tired, but he managed to smile for her. "We're going great, Ma," he said. "I guesstimate ninety-one per cent done. Work will be complete in another six, seven days, and then it will be just clean-up."

"The work's done now," Tolly Mune said.

"What?" He looked baffled.

"Tuf has been lying to us," she said glibly. "He's a con man, a puling abortion, and I'm pulling the crews on him."

"I don't understand," the cybertech said.

"Sorry. Details are classified, Frakker. You know how it goes. Just get off the *Ark*. All of you. Spinnerets, cybertechs, security, everybody. I'll give you an hour, then I'm coming over, and if I find anybody on that derelict except Tuf and his goddamned vermin, I'll ship their rectums out to the Larder faster than you can say *Steel Widow*, you got that?"

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"Uh, yes."

"I mean *now!*" snapped Tolly Mune. "*Move*, Frakker."

She cleared the screen, keyed in a top-priority shield, and placed her final call. Haviland Tuf, infuriatingly, had instructed the *Ark* to screen his calls while he napped. It took her fifteen priceless minutes to find the right formula of words to convince the idiot machine that this was an emergency.

"Portmaster Mune," Tuf responded when his image finally materialized before her, wearing an absurd fuzzy robe belted around his overample stomach. "To what do I owe the singular delight of your call?"

"The refitting is ninety per cent done," Tolly Mune said. "Everything important. You'll have to live with anything we left undone. My spinnerets are scuttling off down the web, fast. They'll all be gone in, uh, now it's down to forty-odd minutes. When that time's up, I want you out of Port, Tuf."

"Indeed," said Haviland Tuf.

"You're spaceworthy," she said. "I've seen your specs. You'll rip apart the dock, but there's no time to pull it down and it's a small price to pay for what you've done. Shift to drive and get out of our system and don't look back over your shoulder, unless you want to turn to goddamned salt."

"I fail to understand," said Haviland Tuf.

Tolly Mune sighed. "So do I, Tuf, so do I. Don't argue with me. Prepare for departure."

"Am I to make the assumption that your High Council found my humble offering to be a satisfactory solution to your crisis, so that I have been adjudged winner of our wager?"

She groaned. "Yes, if that's what you want to hear, you give great vermin, loved the omni-grain, the slime-mold was a real hit, you win, you're brilliant, you're wonderful, now scream it, Tuf, before someone thinks to ask the sickly old Portmaster a question and they notice that I'm gone."

"Your haste has left me nonplussed," said Haviland Tuf, folding his hands calmly atop his paunch and staring at her.

"*Tuf.*" Tolly Mune said, from between clenched teeth. "You won your goddamned wager, but you'll lose your ship if you don't wake up and learn to dance. Get moving! Do I have to spell it out for you, damn it? Treachery, Tuf. Violence. Betrayal. Right at this very moment, the High Council of S'uthlam is discussing all the fine details of how to grab the *Ark* and dispose of you, and arguing about what kind of perfume will make it smell the best. Now do you understand? As soon as they finish talking, and it won't be long, they'll give the orders, and security will be converging on you with vacuum sleds and nerveguns. The Planetary Defense Flotilla has four protector-class ships and two dreadnaughts in the web right now, and if they go on alert, you might not even be able to run. I don't want no goddamned space battle slagging my port and killing my people."

"An understandable aversion," Tuf said. "I shall initiate immediate implementation of departure programming. One small difficulty remains, however."

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"What?" she said, all wire-edged impatience.

"Havoc remains in your custody. I cannot leave S'uthlam until she has been returned safely to me."

"Forget the puling cat!"

"A selective memory is not among my capabilities," Tuf said. "I have fulfilled my portion of our understanding. You must return Havoc or be in breach of contract."

"I *can't,*" Tolly Mune said angrily. "Every fly, worm, and spinneret in the station knows that damned cat is our hostage. If I jump on a train with Havoc under my arm, it will be noticed, and someone is going to ask questions. Wait for that cat, and you're risking everything."

"Nonetheless," said Haviland Tuf, "I fear I must insist."

"God damn you," swore the Portmaster. She wiped out his image with a single furious snap of her fingers.

When she reached the Worldview's lofty atrium, the host greeted her with a brilliant smile. "Portmaster!" he said happily. "How good to see you. You're being paged, you know. If you'd care to take the call in my private office—"

"Sorry," she said, "pressing business. I'll check in from the room." She rushed past him to the elevators.

Outside the door were the guards she had posted. "Portmaster Mune," the left one said. "We were notified to watch for you. You're to call in to the security office at once."

"Certainly," she said. "You two, get down to the atrium, and fast."

"Is there a problem?"

"A big one. A brawl. I don't think the staff can handle it alone."

"We'll take care of it, Ma." They ran off together.

Tolly Mune went inside. The room was a relief; only a quarter-g, compared to the full gravity of the corridors and atrium. It was a tower suite. Beyond a triple-thick window of transparent plasteel was the vast globe of S'uthlam, the rocky surface of Spiderhome, and the brilliance of the web. She could even see the bright line that was the *Ark*, shining in the yellow light of S'ulstar.

Havoc was curled up asleep on the floater cushion in front of the window, but the cat hopped down when she entered and came bounding across the carpet, purring loudly. "I'm glad to see you too," Tolly Mune said, scooping up the creature. "But now I have to get you out of here." She looked around for something large enough to hide her hostage.

The com unit began to scream at her. She ignored it and continued to search. "Goddamn it," she said furiously. She had to hide the puling cat, but how? She tried wrapping her up in a towel, but Havoc didn't like that idea at all.

The com unit cleared; a security override. The head of port security was staring at her. "Portmaster Mune," he said, deferential for the moment, though she wondered how long that would last once the situation became clear to him. "There you are. The First Councilor seems to believe you have some difficulty. Is there a problem?"

"None at all," she said. "Is there any reason for intruding on my privacy, Danja?"

He looked abashed. "My apologies,

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Ma. Orders. We were instructed to locate you immediately and report on your whereabouts."

"Do that," she said.

He apologized again and the screen blanked. Obviously, no one had yet informed him that the *Ark* was being cleared. Good, that bought her a bit more cushion. She moved methodically through the suite one final time, taking a good ten minutes to search everywhere and anywhere for something to stash Havoc in, before she finally gave it up as a lost cause. She'd just have to brazen it out, stride to the docks and requisition vacuum sled, skinthins, and a carrier for the cat. She moved toward the door, opened it, stepped out . . .

. . . and saw the guards running toward her.

She darted back inside. Havoc yowled in protest. Tolly Mune triple-locked the door and raised the privacy shield. That didn't stop them from banging. "Portmaster Mune," one of them called through the door, "there was no brawl. Open please, we need to talk."

"Go away," she snapped. "Orders."

"Sorry, Ma," he replied, "they want us to take that cat downstairs. That's right from the council, they say."

Behind her, the com unit came on once more. This time it was the councilor for internal security herself. "Tolly Mune," the woman said, "you are wanted for questioning. Surrender yourself immediately."

"I'm right here," Tolly Mune snapped back. "Ask your goddamned questions." The guards kept pounding on the door.

"Explain your return to port," the woman said.

"I work here," Tolly Mune said sweetly.

"Your actions are not in accord with policy. They have not been approved by High Council."

"High Council's actions haven't been approved by me," the Portmaster said. Havoc hissed at the screen.

"Place yourself under arrest, if you please."

"I'd rather not." She lifted a small, thick table—it was easy under a quarter-g—and sent it sailing into the vidscreen. The councilor's square features disintegrated in a shower of glass and sparks.

At the door, the guards had coded in a security override. She countermanded it, using Portmaster's priority, and heard one of them swearing. "Ma," the other one said, "that won't do any good. Open up, now. You can't get by us and it won't take them more than ten, twenty minutes to cancel your priority."

He was right, Tolly Mune realized. She was trapped, and once they unsealed the door it was all over. She looked around helplessly, searching for a weapon, a way out, anything. There was nothing.

Far away at the end of the web the *Ark* shone with reflected sunlight. It ought to be clear by now. She hoped Tuf had had the sense to seal up tight when the last spinneret had departed. But would he leave without Havoc? She looked down, stroked the cat's fur. "All this trouble for you," she said. Havoc purred. She looked back at the *Ark*, then at the door.

"We could pump some gas in," one

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of the guards was saying. "The room's not airtight, after all."

Tolly Mune smiled.

She placed Havoc back on the floater cushion, climbed up on a chair, and pulled the cover off the emergency sensor box. It had been a long time since she'd done any mech work. It took her a few moments to trace the circuits, and a few more moments to puzzle out how to make the sensors think the airseal had been broken.

When she did, an alarm claxon began to shrill hideously in her ear, there was a sudden hissing and foaming around the edges of the door as the airseal was activated, the gravity went out, the air stopped circulating, and on the far side of the room, a panel slid open on the cache of emergency vacuum gear.

Tolly Mune moved to it quickly. Inside were breather pacs, airjets, a half dozen sets of skinthins. She dressed and sealed herself up. "Come here," she said to Havoc. The cat didn't like all the noise. "Careful now, don't claw the fabric." She shoved Havoc inside a bubble helmet, attached it to a limp set of skinthins, clipped on a breather pac and turned it all the way up, way past the recommended pressure. The skinthins inflated like a balloon. The cat tried her claws against the inside of the plasteel helmet and yowled piteously. "I'm sorry," said Tolly Mune. She let Havoc float in mid-room while she removed the laser torch from its brackets.

"Who said it was a puling false alarm?" she said as she kicked herself toward the window, torch in hand.

"Perhaps you would care for some mulled mushroom wine," said Havi-

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land Tuf. Havoc was rubbing up against his leg. Chaos was up his shoulder, long gray tail twitching, peering down at the black-and-white cat as if he were trying to remember just who that was. "You appear to be tired."

"Tired?" Tolly Mune said. She laughed. "I just burned my way out of a star-class hotel and crossed kilometers of open space, flying on nothing but airjets and using my feet to tug along a cat in an overinflated pair of skinthins. I had to outdistance the first security squad they scrambled from the dockside ready-room, and use a laser torch to cripple the sled the second bunch came cruising up on, dodging their snares the whole time, still pulling your damned cat. Then I got to spend a half-hour crawling around on the outside of the *Ark*, knocking on the hull like a brain damage case, all the time watching my port go insane with activity. I lost the cat twice and had to chase her down again before she floated off to S'uthlam, and whenever I misjudged an airblast, off we went. Then a puling *dreadnaught* came heaving up at me. I got to enjoy the suspense of wondering when the hell you'd raise your defense sphere, and got to relish the exciting pyrotechnics when the flotilla decided to test your screens. I had a nice long time to ponder whether they'd see me, crawling around like so much vermin on the skin of some damned animal, and Havoc and I had this great conversation about what we'd do when it occured to them to send in a wave of security on sleds. We decided I'd speak sternly to them and she'd scratch their eyes out. And then you *finally* notice us and drag us inside just as the goddamned flotilla is opening up with plasma torpedoes. And you think I might be *tired?*"

"There is no call for sarcasm," said Haviland Tuf.

Tolly Mune snorted. "Do you have a vacuum sled?"

"Your crew abandoned four in their haste to depart."

"Good. I'll take one with me." A glance at the instruments told her that Tuf finally had the seedship under way. "What's happening out there?"

"The flotilla continues to hound me," said Tuf. "The dreadnaughts *Double Helix* and *Charles Darwin* pursue, with their protector escorts close astern, and a cacophony of commanders clamor at me, making rude threats, stern martial pronouncements, and insincere entreaties. Their efforts are to no avail. My defensive screens, now that your spinnerets have so excellently restored them to full function, are more than equal to any weaponry in the S'uthlamese armory."

"Don't test it," Tolly Mune said sourly. "Just get into drive as soon as I'm gone, and get the hell out of here."

"This is sound advice," Haviland Tuf agreed.

Tolly Mune looked at the banks of vidscreens along both walls of the long, narrow communications room that they had refitted as Tuf's control center. Slumped in her chair and crumpled under the gravity, she suddenly looked and felt her age.

"What will become of you?" Tuf asked.

She looked at him. "Oh, that's a choice question. Disgrace. Arrest. Removal from office, maybe trial for high treason. Don't worry, they won't exe-

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cute me. Execution is anti-life. A penal farm on the Larders, I suppose." She sighed.

"I see," said Haviland Tuf. "Perhaps you might wish to reconsider my offer to furnish you with transportation out of the S'uthlamese system. I would be only too glad to take you to Skrymir or Henry's World. If you wished to remove yourself further from the site of your infamy, I understand that Vagabond is quite pleasant during its Long Springs."

"You'd sentence me to a life under gravity," she said. "No thanks. This is my world, Tuf. Those are my own puling people. I'll go back and take what comes. Besides, you're not getting off the hook that easily." She pointed. "You owe me, Tuf."

"Thirty-four million standards, as I recall," Tuf said.

She grinned.

"Madam," said Tuf, "If I might be so bold as to ask—"

"I didn't do it for you," she said quickly.

Haviland Tuf blinked. "My pardons if I seem to be prying into your motives. Such is not my intent. I fear curiosity will be my downfall someday, but for the nonce I must inquire—why *did* you do it?"

Portmaster Tolly Mune shrugged. "Believe it or not, I did it for Josen Rael."

"The First Councilor?" Tuf blinked again.

"Him, and the others. I knew Josen when he was just starting out. He's not a bad man, Tuf. He's not evil. None of them are evil. They're decent men and women, doing their best. All they want to do is to feed their children."

"I do not understand your logic," said Haviland Tuf.

"I sat at that meeting, Tuf. I sat there and listened to them talk, and I heard what the *Ark* had done to them. They were honest, honorable, ethical people, and the *Ark* had already turned them into cheats and liars. They believe in peace, and they were talking about the war they might have to fight to keep this puling ship of yours. Their entire creed is based on the holy sanctity of human life, and they were blithely discussing how much killing might be necessary. Starting with yours. You ever study history, Tuf?"

"I make no special claims to expertise, but neither am I entirely ignorant of what has gone before."

"There's an ancient saying, Tuf. Came out of Old Earth. Power corrupts, it went, and absolute power corrupts absolutely."

Haviland Tuf said nothing. Havoc bounded onto his knees and settled down. He began to stroke her with a huge pale hand.

"The dream of the *Ark* had already begun to corrupt my world," Tolly Mune told him. "What the hell would the reality of possession have done to us? I didn't want to find out."

"Indeed," said Tuf. "A further question suggests itself."

"What's that?"

"I now control the *Ark*," Tuf said, "and therefore wield near absolute power."

"Oh, yes," Tolly Mune said.

Tuf waited, saying nothing.

She shook her head. "I don't know," she said. "Maybe I didn't think things

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through, maybe I was just making it up as I went along, maybe I'm the biggest damned fool you'll find for light-years."

"You do not seriously believe this," said Tuf.

"Maybe I just figured it was better you got corrupted than my own. Maybe I think you're naive and harmless. Or maybe it was instinct." She sighed. "I don't know if there is such a thing as an incorruptible man, but if there is, you're the one, Tuf. The last god-damned innocent. You were willing to lose the whole thing for her." She pointed at Havoc. "For a cat. Damned puling vermin." But she smiled as she said it.

"I see," said Haviland Tuf.

The Portmaster pulled herself wearily to her feet. "Now it's time to go back and make that speech to a less appreciative audience," she said. "Point me to the sleds and tell them that I'm coming out."

"Very well," said Tuf. He raised a finger. "One further point remains to be clarified. As your crews did not complete all of the agreed-upon work, I do not think it equitable to charge me the full price of thirty-four million standards. I suggest an adjustment. Would thirty-three-million five-hundred-thousand standards be acceptable to you?"

She stared at him. "What difference does it make?" she asked. "You're never coming back."

"I beg to differ," said Haviland Tuf.

"We tried to steal your ship," she said.

"True. Perhaps thirty-three million would be fair, the rest being considered a penalty of sorts."

"You're really planning to return?" Tolly Mune said.

"In five years," said Tuf, "the first payment on the loan will be due. By that time, moreover, we will be able to judge what effect, if any, my small contributions have had upon your food crisis. Perhaps more ecological engineering will be necessary."

"I don't believe it," she said, astonished.

Haviland Tuf reached up to his shoulder and scratched Chaos behind the ear. "Why," he asked reproachfully, "are we always doubted?"

The cat did not reply. ■

● I do not know what I may appear to the world; but to myself I seem to have been only like a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me.

Sir Isaac Newton

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Special Feature

THE CONSTITUTIONAL ORIGINS OF WESTLY V. SIMMONS

Paul A. Carter

EDITOR'S NOTE: This is hard to classify. It's not a fact article, since the events described didn't happen; yet it's not fiction in any conventional sense of the word. It's not a "State of the Art" piece, even though it uses an Astounding *story as its take-off point. It is a good exercise in a kind of thinking science fiction writers need, as a historian traces, step by step, how a drastically different "parallel world" could have become reality with just a few little changes in our recent past. . . .*

"A new author presents a new type of obstacle that may face the first rocketship's inventor—the minds of men did not always run as they do now."

That story-blurb introduced "Trends," in the July, 1939 issue of *Astounding Science Fiction*. As every school child knows, or ought to know, this was the story that really launched its author—not then possessed of a graduate degree, and therefore not yet known as the Good Doctor—upon his meteoric career. (I don't know why careers should be referred to as meteoric; meteors after they ignite do not commonly continue to glow for four and a half decades, as the Good Doctor has. But let that pass.)

"Trends" begins in 1973—but in a very different kind of 1973 from the year we know by that name on our own time-track. Instead of the swinging yet anxious moral anarchy of our own sev-

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enties, these seventies are at the opposite extreme—a stuffy, conformist "second Victorian Age." And instead of having a national space program that is winding down, or at any rate taking a breather, after a spectacular series of landings on the Moon, the 1973 of "Trends" has a space program that is just getting started; that is privately financed (in mere millions, not billions); and that is badgered by revivalists who charge that landing on the Moon would be contrary to the will of God: "It is not given to man to go wheresoever ambition and desire lead him. There are things forever denied him, and aspiring to the stars is one of these."

The "trend" of the story's title is religious fundamentalism, and in the story the fundamentalists win the first several rounds. The story illustration (by Paul Orban, one of *Astounding*'s best pen-and-ink people) shows the hero's first Moon rocket blowing up on the launch pad—not because of mechanical failure or designer error, as sometimes happened on our own time track, but as a result of sabotage by a fanatic disciple of "Otis Eldredge," the revivalist leader. Public indignation leads to the passage by Congress—unanimously—of the "Zittman Antirocketry bill"; and the next Congressional elections—those of 1974—give Eldredge and his Twentieth Century Evangelical Society control of the U.S. House of Representatives and the balance of power in the Senate. (Does this begin to sound just somewhat familiar?)

"At the first session of the ninety-third Congress, the famous Stonely-Carter bill was passed," historian Asimov continues. "It established the Federal Scientific Research Investigatory Bureau—the FSRIB—which was given full power to pass on the legality of all research in the country"—and to "ban absolutely all such as it disapproved of." Because Americans have always tended to turn political and social questions into legal ones—as in the famous *Dred Scott* decision on slavery—the constitutionality of the Stonely-Carter Act is promptly challenged before the Supreme Court. The Court, by a 5–4 margin, upholds the right of the Federal Government thus to suppress and outlaw scientific research, in a decision that goes into the law books as *Westly* v. *Simmons*. On the "Trends" time track, the formal citation might be "*Westly* v. *Simmons*, 420 U.S. 1 (1974)"—which for the benefit of us nonlawyers can be translated as: decision of the Supreme Court as between the plaintiff on appeal, whom the Good Doctor identifies as Joseph Westly of Stanford, defending his constitutional right "to continue his investigations on atomic power," and the defendant Simmons, whom Asimov does not identify but who we presume is a Federal administrator; as found in Volume 420, page 1, of *United States Reports*, the official record of all the decisions handed down by the Supreme Court.

Volume 420 on our time track covers October term of 1974 (which extends into 1975; Supreme Court cases are normally argued in the fall, and decided during the following winter and spring). Asimov states that Westly made his ap-

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peal on November 9—a mere two or three days after that disastrous Congressional mandate—and that it took two months for the case to be decided. Two months from November 9th puts us shortly after New Year's in 1975. Since Congress (by the 20th Amendment to the Constitution, adopted—on both time tracks—in 1933) normally meets at noon on the third of January, the new Congress, with its Otis Eldredge-controlled Moral Majority bias, has just met and organized. We may therefore presume an intense evangelical atmosphere in and around the splendid Greek-pillared Supreme Court building itself; prayers and hymns on the lawn and steps outside, very likely, although in the Court's own chambers its historic sense of decorum—especially in a "neo-Victorian age"—would probably prevent any interruption of the reading of the formal opinion in *Westly* v. *Simmons* by unseemly shouts of "Praise the Lord." Nonetheless, as American folk political wisdom has it, "The Supreme Court follows the election returns."

Now there is no way—*no way*—that the Supreme Court which was sitting from November, 1974 through January, 1975 on *our* time track could have rendered any such judgment as *Westly* v. *Simmons*.

Consider who they were: William O. Douglas, that venerable champion of civil liberties all through the dark McCarthy era. Chief Justice Warren Burger, who voted against the President who appointed him (Nixon) on the question of the Pentagon Papers, which also involved a constitutional right to engage in private investigation and publicize one's findings. Thurgood Marshall, that doughty champion of civil rights whose legal work for the NAACP had paved the way for the desegregation of our schools. Harry A. Blackmun, who wrote the Court's landmark decision on abortion, *Roe* v. *Wade* (on our time track at 410 U.S. 113, 1972)—a decision that would hardly have pleased Otis Eldredge and his moral majoritarians. William Brennan, who struck many blows from the Bench against literary censorship. That gives you a majority of five right there; and if you add Potter Stewart, who on our time track wrote a second concurring opinion in the Roe case, and Byron White, a Kennedy appointee who would have retained something of the pro-science spirit of the New Frontier, the majority becomes unbeatable. Even if you count the other two Nixon appointees (Lewis Powell and William Rehnquist) as voting on the other side, Joseph Westly would have won his case 7–2, and presumably gone on experimenting with atomic power.

The time track on which "Trends" took place must logically have diverged from the Apollo Eleven time track in 1939, when John Campbell first published the story in *Astounding*. The problem, then, is how to account for the naming of a Supreme Court which would have gone against Mr. Westly, in the series of presidential elections —and opportunities for naming Supreme Court Justices—between 1940 and 1972. How was that majority against freedom of science politically put together?

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Do we have to go back as far as 1939 for the divergence of the "Trends" time-track from our own? Yes, I think we do. There is a clue pointing to that conclusion, in Asimov's description of how the case came to trial. "Joseph Westly of Stanford upheld his right to continue his investigations on atomic power." That's quite a large subject for one scientist to be investigating, all by himself, without benefit of corporate finance, foundations grants, or hosts of hard-working graduate student assistants. Atomic power, in the 1974 of "Trends," thus seems to be a field whose investigation is still in its infancy—a stage at which individual investigators are still able to do important pioneering work. Otis Eldredge can, and does, urge his minions to mob a space ship before it takes off; but apparently the ungodly scientific menaces of his time do not include nuclear power plants, ICBMs, or radio-cobalt for treating cancer.

Whatever became of the Manhattan Project?

On our time track, the building of the first atom bomb goes back to a letter which Albert Einstein wrote to President Franklin Roosevelt in August of that same fateful year 1939. On October 11th it reached the President's desk. In the meantime World War Two had begun; it was a moment when FDR had a great deal on his mind besides some theoretical scientist's speculations about possible practical consequences of the recent successful fissioning of uranium isotope 235. According to science journalist Robert Jungk, Roosevelt came very near giving the whole idea the brushoff; and he was only brought around when Alexander Sachs, the financier and New Deal adviser who actually handed him Einstein's letter, reminded the President that Napoleon had blown a great chance to beat the English when he turned down American inventor Robert Fulton's offer of a fleet of steamships for a cross-channel invasion.

All we need to change here is one tiny historical detail: Alexander Sachs comes down with the flu. He doesn't get to see Roosevelt when the Einstein letter arrives.

FDR—notoriously a person with a short attention span—reads the letter, finds it interesting (like all those science fictional notions one found in 1939 in the more sensational Sunday newspapers), and write Einstein a typically Rooseveltian reply—amiable, respectful of the distinguished scholar's stature in the world, and absolutely noncommittal.

So there is no Manhattan Project!

Now, hold on. Wouldn't Leo Szilard and the other atomic scientists have continued to badger the President about the bomb? Certainly; but if the well-known (and popular, in his wispy-haired absent-minded way) Albert Einstein, the very image of "Mr. Scientist," couldn't get through the Presidential preoccupations, could they have expected to fare any better?

Well—all right, but weren't the Germans also working on the Bomb? Of course they were; their V-2 rocket (the ancestor of Apollo/Saturn) was the first

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IRBM, and with a nuclear warhead would have been a fearsome weapon indeed. But on our time track, for various reasons—including an idiotic debate over whether Einstein's equations could be trusted, since they were an example of "Jewish Physics"!—the Nazi equivalent of the Manhattan Project never quite came off. We may assume the same outcome on the "Trends" world-line.

But after the war wouldn't the Russians have developed the bomb? They had at least one of the world's top nuclear physicists, up in the Einstein-Fermi-Bohr-Oppenheimer class, in the person of Pyotr Kapitsa; and physics —unlike some of the other sciences (notably Western-style genetic biology)—flourished in Stalin's Russia. What they did *not* have, on the "Trends" time-track, was incentive. Nobody in the West had the drop on them with a proven, tested atomic weapon, and they had a whole Nazi-devastated country to rebuild.

What about Hiroshima and Nagasaki, which Harry Truman to the end of his days believed had been necessary to shorten the war and save, over the long run, hundreds of thousands of American and Japanese lives? The only catch in Truman's reasoning is that we now know that the government formed in Tokyo immediately after the fall of Okinawa (April, 1945) had a clear mandate to negotiate an end to the war. It was a question not of *whether* but of *when*.

Therefore—Assumption Number One—World War Two ends with no nuclear bomb; ends in approximately the same way with the same messy aftermath, including a Cold War, economic dislocation in Europe necessitating a Marshall Plan, and the Communization of Eastern Europe and of China. But no fearsome atomic doom hovers over the planet. The "neo-Victorian Age" in which "Trends" takes place is thus a relatively peaceful era—as indeed the *first* Victorian Age had been, with no major war involving all the Great Powers at the same time for the 99 years between Napoleon's downfall in 1815 and the outbreak of World War One in 1914.

The time of "Trends" is an age which looks back upon no Hiroshima, no Nagasaki. But it does look back upon other scientific contributions to slaughter: saturation bombing, flame-throwers, phosphorus, proximity fuses, computers, radar. So Asimov's summary of one of Otis Eldredge's arguments still holds: "that it was science that brought about the horrors of the Second World War. Science outstripped culture, they will say, technology outstripped sociology, and it was that imbalance that came so near to destroying the world."

It is an attractive argument; and in the absence of a perceived *scientific* threat from the Russians, it wins the support for Eldredge's Evangelical Society of all sorts of people who would never otherwise have bought its theology.

The first step toward *Westly* v. *Simmons* has been taken.

And one judge who will sit for that decision is already on the bench. Wil-

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liam O. Douglas, still active on the Supreme Court in *our* 1974, was already a member of that Court in 1939 when *Astounding* published "Trends." Given Bill Douglas's valiant stands for freedom of thought on our world-line, I think we may count him among the four Justices in the *Westly* case who would have dissented.

But who were his eight colleagues?

Harry Truman probably succeeded FDR in the world of "Trends" as in ours; there is no reason why the absence of a Manhattan Project need have affected the outcome of the Democratic National Convention of 1944. Mr. Truman in the course of his Presidency (on our time track) made four Supreme Court appointments; however, none of them were still on the Bench in our 1974, and the Harry of "Trends" therefore bears no direct responsibility for *Westly* v. *Simmons*.

The next crucial divergence between our world-line and that of "Trends" comes with the election of 1952.

The Republican National Convention of that year was a re-run of the one the G.O.P. had gone through in 1912: Old Guardsmen, led in both cases by a man named Taft (William Howard in '12; his son Robert in '52), controlling the party machinery and challenging the right to seats in the Convention of insurgents, committed in '12 to Theodore Roosevelt, in '52 to Dwight D. Eisenhower.

Ike, campaigning on our world-line in 1952, told a crowd at Soldier's Field in Chicago that "isolationism in America is dead as a political issue." But would it have been so dead, in the absence of the omnipresent Bomb? Might not the conservative, respected "Mr. Republican" from the isolationist Midwest, Bob Taft, have held the line at the Convention and become the Republican nominee?

Our 1952's Democratic choice came from that same Midwestern heartland: Adlai E. Stevenson. A landslide victor for governor of Illinois in 1948 (running far ahead of Truman), eloquent, brilliant, and with the devoted support of the Chicago party machine, he is easy to see as the Democratic candidate in the "Trends" world also. In the alternative world—ours—war hero Eisenhower beat him decisively; nevertheless, even in defeat Stevenson statistically held onto those traditional "New Deal" elements in the Democratic coalition —labor, Southerners, ethnics, Catholics—whom Walter Mondale notoriously would not be able to command in 1984. Therefore—Assumption Number Two—Adlai Stevenson is elected President of the United States in 1952.

At once, two of the Supreme Court Justices from the 1974 of our own timeline—William Brennan and Potter Stewart —vanish from the Bench, because they were Eisenhower appointees.

Now Adlai, with his high standards of governance, might have made—*would* have made—distinguished Supreme Court appointments; better, in a couple of instances at least, than Ike's. But they would not have included Republican Earl Warren; and Justice Warren's fifteen-year tenure on our time track decisively changed the Supreme Court, and changed America. We speak of that

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decade-and-a-half as "the Warren Court" in the same respectful way that we refer to the 35-year "Marshall Court" (1801–1835) under the great John Marshall. In the absence of Warren's dynamism, a drift toward *Westly* v. *Simmons* becomes far more plausible.

President Stevenson makes three Supreme Court appointments, corresponding to the three in Eisenhower's first term. Given the philosophical outlook of this President, I propose that they be counted as pro-science and pro-freedom of thought. In due course they will join Mr. Justice Douglas in dissent on *Westly* v. *Simmons*, but only if they live long enough. One of Ike's first-term appointees (Brennan) lasted until 1974; the other two (Warren and Harlan) did not. Let's give our hypothetical President Stevenson the same box score; that gives one Stevenson appointee (perhaps that dogged, articulate liberal Senator Hubert Humphrey?) in dissent in the *Westly* case, plus Douglas. So far, the Otis Eldredges of this other America seem if anything to be losing ground.

Since President Stevenson, like President Eisenhower, would have had a Chief Justiceship to fill in 1953 (owing to the death of Fred Vinson, appointed by Truman), he plays that card as powerfully as he can—not by naming a new member, necessarily; Associate Justices can also be promoted to the top position, as FDR had done with Harlan F. Stone. And it would be a grand gesture indeed to name as Chief Justice another Roosevelt appointee, equally as renowned as Douglas for championing constitutional liberties, namely Hugo L. Black. That would also be no consolation to Otis Eldrege, et. al., for Black had always been a rigorous advocate of the separation of church and state; more so, indeed, than Douglas. (See, on our time track, Black's dissenting opinion against "released time" for religious instruction for New York school children, in *Zorach* v. *Clauson*, 343 U.S. 306, 1952.)

President Stevenson would have had the same agenda of unfinished business on that time track as did President Eisenhower on ours. The most notably unfinished item on the list was the Korean War; and here I make Assumption Number Three: the Korean War does not end in 1953. It drags on, and on, and on.

Ike in our universe went to Korea after the election; Stevenson had made plans, if elected, to do the same, but with characteristic modesty chose not to publicize the fact during the campaign. One can visualize him, as President-Elect and as President, vigorously pursuing the same mixture of push and persuasion which on our time-track brought a cease-fire seven months after the inauguration. However, we must bear in mind that one "wild card" in Eisenhower's hand, because of Assumption One, is not there for President Stevenson to play: the A-bomb. (Ike in his memoirs stated that he let the Chinese know that if they didn't cooperate he was prepared to play it.)

Even with that card in hand, Eisenhower secured only a *compromise* settlement in Korea—and made it stick with the hotheads in Congress, who

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were still echoing General MacArthur's "In war there is no substitute for victory." President Stevenson, or indeed *any* civilian president, would have been vulnerable to the same "wimp" ploy that was used so effectively against Mondale in 1984 on our time line; a charge from which General Eisenhower was ex officio exempt. So, in the "Trends" universe, the hawks in Congress won't stand for a compromise in Korea; the war goes on for another year, and another, and another.

And an anti-war movement starts, ten years earlier than on our time line.

And Joe McCarthy dies in 1956 without ever having been censured by the Senate.

Chief Justice Black hands down a sweeping civil rights decision, but without the unanimity in the Court secured by Earl Warren in *Brown* v. *Board of Education*. The civil rights movement awakened by that decision coalesces with the movement against the war.

The equivalent of our Sixties arrives a decade early!

Stevenson faces other foreign challenges successfully. One of them he handles far better than Ike in our universe. He names as his Secretary of State, former UN delegate Eleanor Roosevelt—a brilliant appointment, marred only by the persistence of those awful old Eleanor jokes that went all the way back to the New Deal years. (The women's movement, triggered by this example, also jumps forward a decade as compared with our time line.) Secretary Roosevelt, unlike Ike's Secretary Dulles, has the wit to help Egypt build its High Dam at Aswan; Egypt's leader Nasser than has no political need immediately to nationalize the Suez Canal; and so the Suez Crisis of 1956—and following from it, the Lebanon crisis of 1958—do not take place. But all such successes are swallowed up in the frustration of the ongoing war in Korea, much as Jimmy Carter's diplomatic triumph at Camp David was obscured for the public by his four hundred and forty days of trouble with Iran.

The political backlash against Stevenson proves too great to overcome. A reluctant Democratic convention renominates him in 1956, but even with Mrs. Roosevelt on the ticket as his running mate he is fated to lose the election. The Republicans, never having faced and broken the McCarthy spell, turn to the politician who once (on both time tracks) scurrilously described Adlai as "a graduate of Dean Acheson's Cowardly College of Communist Containment," and next President of the United States turns out to be Richard Milhouse Nixon.

President Nixon's 1957–1961 term coincides with what on our time track was Eisenhower's second term. That gives him, other things being equal, an opportunity to make two Supreme Court appointments; both of them, if they live long enough, are possible participants in *Westly* v. *Simmons*, although on our time line only one of them—Potter Stewart—lasted that long.

Now *our* Nixon also became President, albeit not until another twelve years had gone by. And our Nixon also had chances to make appointments to

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the Supreme Court. Two proposals he made were so bad that the Senate turned them down. But the demoralized Senate of the "Trends" world—a Senate which had never censured Joe McCarthy—is more docile; and so the conservative Clement Haynesworth and the hapless G. Harrold Carswell are elevated to the highest court in the land. Both are segregationists, and *that* doesn't help the cause of racial justice in America; nor the cause of civil and political tranquility. Later on, it is reasonable to assume, these judges will also become two votes for the suppression of science in *Westly* v. *Simmons*.

Nixon is a shoo-in for renomination by the Republicans; he runs in 1960 against John F. Kennedy—the logical Democratic choice—not as Eisenhower's Vice-President, as on our timeline, but as a sitting President, which makes a considerable difference.

The 1960 campaign is, in the main, a shrill series of "I'm even more anti-Communist than you are" speeches. Insurgent youths, blacks, and antiwar protestors find the election utterly frustrating; there are riots at *both* the Republican and Democratic national conventions. In the midst of all this uproar one of Adlai Stevenson's Supreme Court appointees, the distinguished black jurist William H. Hastie (who had earlier been unsuccessfully recommended to Truman for the high court), unexpectedly dies in office. Anticipating by eight years the "Southern strategy" which on our time track we associate with 1968, Nixon nominates for the Hastie vacancy none other than Strom Thurmond.

It not only gives Nixon in the "Trends" 1960 the Southern states that Barry Goldwater on our time track would carry in 1964; it also re-ignites old fires in the South which had been pretty well banked since the days of Al Smith. John Kennedy's encounter with the Protestant ministers of Houston in 1960 is a far more rowdy affair in the "Trends" world than it was in ours. Fundamentalist religion, which had always heavily emphasized anti-Catholicism, becomes a major political force—counterbalancing the other kinds of protest and dissent. Otis Eldredge, displacing the good-natured and gentlemanly Billy Graham as America's leading evangelical spokesman, becomes a power in the land.

And the forces of repression moving toward the showdown in *Westly* v. *Simmons* now have a 3–2 majority.

Many liberals and radicals, in disgust and disillusion, boycott the election; had they not done so, there might still have been a New Frontier. As it is, Nixon narrowly but decisively ekes out a second term. Then, in 1962, just as he did on our time line under JFK, Justice Frankfurter resigns, which gives President Nixon another Supreme Court vacancy. Anticipating a challenge to his own control over the GOP from the man who had been the sentimental favorite, although not the nominee, at the 1960 Republican convention (on both time tracks)—and who on the bench will be a reliable conservative—Nixon sends the Senate the name of Barry Goldwater.

From the science suppressors' point

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of view, that turns out to have been a mistake. The Barry Goldwater we know on our time track notoriously does not like the Moral Majority and has had some pungent things to say about its leader; there is no reason to assume he would look any more kindly upon Otis Eldredge. The *Westly* v. *Simmons* forces are now split 3–3.

But then another of President Stevenson's appointees, Madame Justice Rita Hauser, retires from the Court; and Nixon, with an eye to co-opting the opposition, chooses a well-known Democrat: Senator William Proxmire of Wisconsin.

Senator Proxmire is as scrupulous as any Republican against wasting the taxpayer's money; and, in the "Trends" world—as in ours!—he usually defines "waste" as "any expenditure by the government for the purpose of basic scientific research." It's penny-wise and pound-foolish; but it gives the champions of a Federal Scientific Research Investigatory Bureau a margin of 4–3.

Suddenly, with one of those spectacular 180-degree turns for which he was famous in our universe as well, the President negotiates an end to the war in Korea (and the one in Vietnam, and the one in the Formosa Straight, and the one in Cuba, and the one in Africa). Quietly cursing the 22nd Amendment to the Constitution (for which he voted in 1947 as a Congressman), which will not allow him to seek a third term in 1964, Richard Nixon hands the reins of office over to Spiro Agnew. The Democrats try again with John Kennedy (who was not assassinated in 1963, of course, because he was not President); but presidential candidates, once beaten, are like the old adage about heavyweight boxers—"they never come back." Spiro (Spiro Who?) is duly elected.

His standards of political greed being no better in the "Trends" world than they proved to be in ours, that President is impeached. Given the intense neo-Victorian moralism which is beginning to rise as a backlash from the insurgency of the Stevenson years, Agnew is removed from office, to shouts of general satisfaction—but not before he has filled Justice Tom Clark's seat, which became vacant in 1967, with an obscure Federal district judge, Jeffries Hathorne, unknown on our time-line, but recommended —and pushed—for the job by none other than Otis Eldredge himself.

By this time, bending before the neo-Victorian tide, the makeup of Congress has considerably changed. Ulrich Stonely, an ultra-conservative Republican from South Dakota, holds the Senate seat which on our time line belonged to George McGovern. "Ace" Carter, a born-again Baptist from Georgia, chairs a special House Committee on Science and Technology. Together they will draft the famous Stonely-Carter Act. And Howard Zittman, campaigning on the theme "Just because I come from New York City doesn't mean I have to be a liberal," captures a Manhattan congressional district and begins to line up votes for the Zittman Anti-Rocketry Bill.

But history has continuities as well as changes. Faces familiar to us con-

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tinue to appear in the world of *Westly* v. *Simmons*.

Gerald Ford, stepping up from the House Speakership, serves briefly as President to fill out Agnew's term until 1968. There is no 25th Amendment, specifying the conditions of Presidential succession, in the "Trends" world; and neither, in the gathering atmosphere of patriarchal neo-Victorianism, is any nonsense added to the Constitution to give 18-year-olds the right to vote. Nor does the District of Columbia achieve suffrage; the only constitutional amendments under serious discussion in Congress—a decade and a half early—have to do with abortion and prayer.

After two terms of Nixon and a partial one of Agnew, with no Kennedy-Johnson regimes for relief, the Democrats just about *have* to win the next election. And they do. They find a spellbinding speaker, with some compelling national issues, and he pulls enough blue collar and Southern votes away from the GOP to carry the Electoral College.

His name is George Corley Wallace.

For Chief Justice Black, that is the last straw. On our time-track, Mr. Justice Black retired in 1971. On the "Trends" time-track, he hangs grimly on, as people will do when they have urgent unfinished work, even in the face of death itself. And so, by sheer moral determination, the venerable New Deal statesman and Southern liberal survives to cast his vote in dissent in *Westly* v. *Simmons*.

In the meantime, in the absence of any Federal commitment to go to the Moon, private entrepreneurs have begun to probe at outer space. One of them is John Harmon, the intrepid hero of "Trends." Those of us who have read the story know that it will have a happy ending. Harmon comes back from his lunar orbit with words every bit as memorable as Neil Armstrong's—"I've reached the Moon, and you can't hang *that*"—and the historical pendulum swings back again.

Yet the decision in *Westly* v. *Simmons* stands there in the austere pages of *U.S. Reports*: "Mr. Justice Thurmond delivered the opinion of the Court . . . Mr. Justice Proxmire, together with Mr. Justice Haynesworth, Mr. Justice Carswell and Mr. Justice Hathorne concur in this opinion . . . Mr. Chief Justice Black, with whom Mr. Justice Douglas, Mr. Justice Humphrey, and Mr. Justice Goldwater join, dissent." It is 5–4 against the freedom of science, and it will take years of litigation to undo.

And George Wallace—an unreformed, segregationist Wallace—is in his second Presidential term and will be presiding in 1976 over our Revolutionary bicentennial.

The universe of "Trends," already behind ours in its timetable for reaching the Moon, has a lot of catching up to do in other areas as well.

On second thought—maybe we shouldn't so cheerfully congratulate ourselves. That repressive, racist, censorious other universe at least does not have the nuclear terror hanging over its head. Not yet.

The one common conclusion we can come to, concerning both universes, is that it was very, very important that humanity go to the Moon.

And that the line between collective folly and political good sense is very thin. ■

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Jay Kay Klein's biolog

With a personality and clearness of thought so unusual as to seem idiosyncratic, Les reminds me of Eric Hofer, the self-educated philosopher. All his life Les has been a "working man" with his hands and a "thinking man" with his mind.

He was raised in Minnesota on tenant farms. One summer he set up the bottles in a circus games concession. Later, he worked as a bootblack, newsstand attendant, door-to-door magazine salesman, billing clerk, White Tower counterman, fix-it-man, and sheet metal fabricator.

His best known line of work started when a girlfriend taunted him into writing. This story appeared here in April, 1938, right at the beginning of the Golden Era of Science Fiction. Les decided to master this new craft that promised more money and shorter working hours. A lot of thought went into this, sometimes on his own, sometimes with other writers, and sometimes with then-editor John Campbell.

Les's readings included SF magazines and Edgar Rice Burroughs. He started appearing regularly in this magazine's letter column in 1935, as Ramon F. Alvarez Del Rey. His second letter in May, 1935, began: "I've decided that it's my duty, not only to get new readers for Astounding, but also to write in regularly in the hope of helping you a little to 'lay a pattern for the future.' "

His first story took second place in AnLab. December, 1938, saw "Helen O'Loy," which became an acknowledged masterpiece. With September, 1942, another masterpiece extrapolated realistically about a nuclear plant accident. "Nerves" did something never done before: ranked first without a single dissent. Les's stories offered characterization, tenderness, and evocation of mood during a time of "slam-bam" pulp writing.

He continued to write here and there, including a novel in 1952 opening with the first man to set foot on the Moon in the 1960s, an American officer named Armstrong. Some work appeared in this magazine's fantasy companion, *Unknown Worlds*. He edited four SF magazines, and worked for one of the leading literary agents.

In the '70s he married a woman who had started as assistant editor on an SF magazine, going on to become an influential editor at Ballantine Books. He became Ballantine's chief fantasy editor, with his wife handling SF. Several years ago, the company started issuing its imaginative fiction line as Del Rey Books.

Les is now helping other writers as he saw it done here. Dr. Robert Forward says his Hugo-winning novel *Dragon's Egg* had been turned down without much comment by several editors. But Les wrote a 14-page letter of commentary (Les says his letters are longer than Campbell's). Dr. Forward followed the fixit-man's advice.

Robert Heinlein told me: "Lester is the best editor I've ever worked with." Les picked up the editing approach that made *Analog* a leader: it's a sort of master craftsmanship that causes stories to spring up like dragon's teeth. ■

Lester Del Rey

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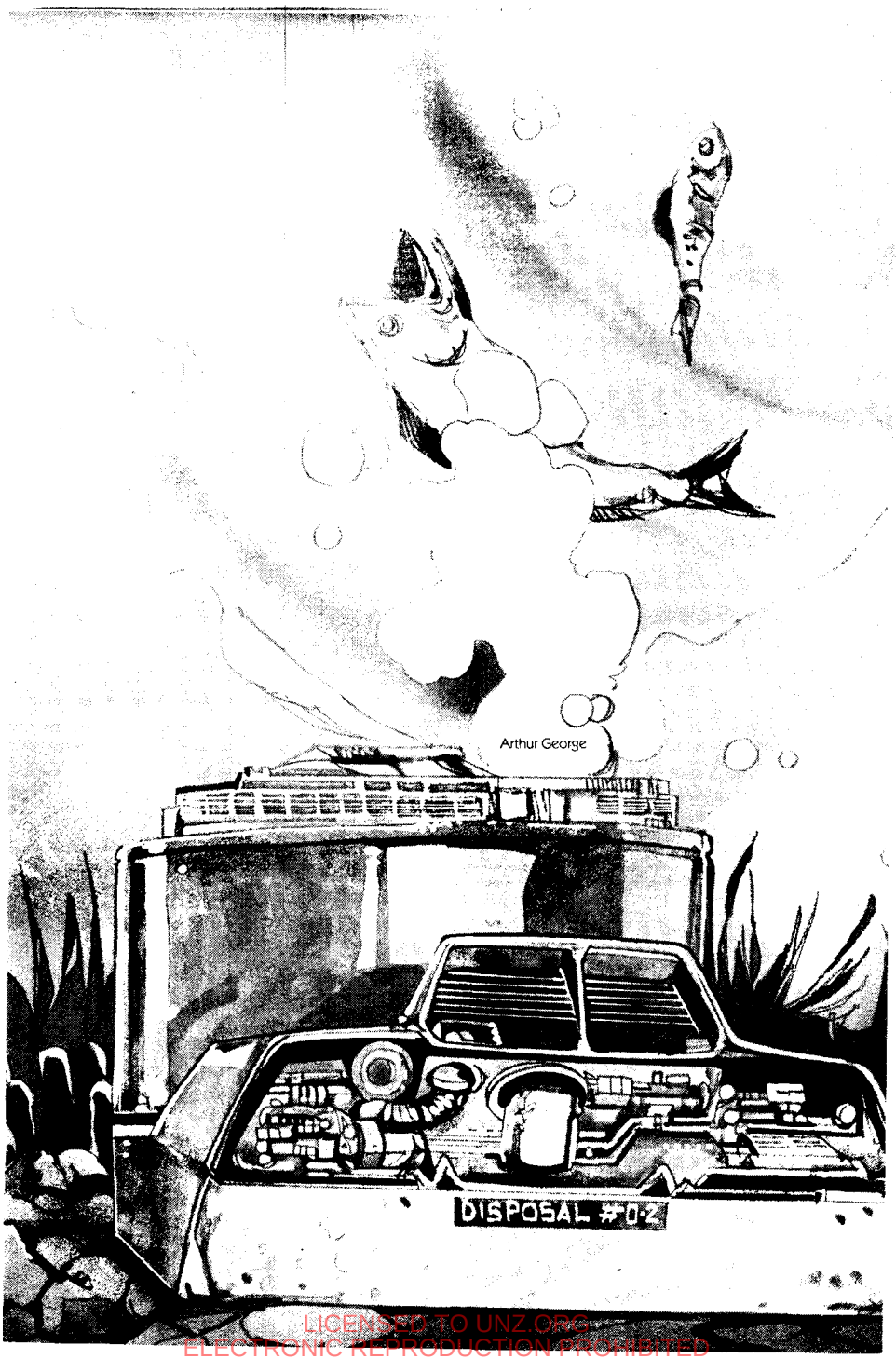

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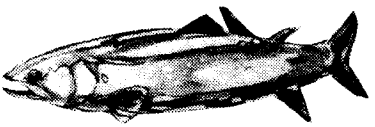
New York, NY 10017



Dear Mr. Schmidt:

I'm scared! I'll try to keep this letter as coherent as possible—but I'm really scared! You (or maybe Ben Bova) are my last hope; no one else takes me seriously. I've attached some copies of the documents to help prove what's happened, but if you need some of the intermediate details (like the Purchase Order), I've got copies of almost everything.

When you look at the memos and reports attached, you'll see that I've been involved almost as long as your magazine. It started for me in November of 1978. . . .

11/12/78

MEMORANDUM
To: Chief of Maintenance
From: District Naturalist
Subject: Attached Advertisement

Ramon, a friend of mine, sent me the attached ad with a note that we might be able to use it for garbage clean-up in the park. Jerry

Black Hole Disposal Units

For bathroom, kitchen—everywhere! When it comes to Black Holes, nobody knows more about their control and installation than Nothingness Unlimited. ■ Whatever your disposal needs, Nothingness has precisely the right Black Hole for the job: subatomic for your toilet or kitchen facility—dust-particle-size for those "giant" waste problems. ■ Nothingness units are easy to install, maintenance-free and thoroughly safe. *And* they come in *7* decorator colors (take our word for it.). ■ Call today and find out how little it costs to get our holes working for you.

CLOSE/UP MODEL BH23
Avocado and Brushed Chrome
Infinite Warranty

FILLING YOUR NEEDS WITH NOTHING AT ALL.

Nothingness Unlimited

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MEMORANDUM 1/18/79
To: District Naturalist
From: Chief of Maintenance
Subject: Disposal Unit

Hey, Buddy, thanks for the tip! It took a while to get the info on the disposal unit (with Christmas and all—I just got their brochures.) It looks pretty good & the prices aren't bad.

2/7/79

MEMORANDUM
To: Superintendent, VOYA
From: Chief of Maintenance
Subject: YACC Project, 1979

The major Young Adult Conservation Corps (YACC) project in Voyageurs National Park for 1979 will be garbage-dump clean-up and cabin removal from the islands and other water accessible areas of Rainy Lake. Unless hazardous conditions are involved, garbage clean-up on Kabetogama, Namakan, and Sand Point Lakes will be low priority this summer.

I have received authorization from the YACC project directors to obligate $5200 for a new technology disposal unit that will be mounted on one of the maintenance barges. This disposal unit will be the kingpin of the YACC garbage clean-up project.

We have been authorized 12 YACC positions for 1979.

MEMORANDUM 7/17/79
To: Superintendent, VOYA
From: Chief of Maintenance
Subject: YACC Clean-up Project

This memo is to formally advise you that the YACC clean-up project is well ahead of schedule. The disposal unit works like a charm. We've cleaned up 17 dump sites and removed three structures. Without the disposer, all of this garbage would have had to be carried out by boat, then trucked to another dump.

As a result of the increased efficiency of our crews with the disposer unit, we may be able to concentrate on Kabetogama & Namakan next year.

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. . . worked very efficiently. When something works that well, you don't usually worry about what could go wrong.

By late summer the crews were working on the far east end of Rainy Lake, near Kettle Falls. Rainy Lake is mostly large, open water, but there is an area called Brule Narrows that can be dangerous, for the inexperienced navigator (even if he is following the buoys) and sometimes even causes problems for the pros—especially in bad weather. That's what happened to the. . . .

9/26/79

MEMORANDUM
To: Superintendent, VOYA
From: Rainy District Ranger
Subject: Rescue of Maintenance Barge, September 24

The storm last Monday was the worst I have seen in six years of experience on Rainy Lake. I responded to the radio distress call put out by the crew on the maintenance barge after their near capsizing. After thorough investigation, I am satisfied that there was no negligence involved, and that we are quite fortunate the barge merely lost its load overboard, and did not capsize. As it was, there were only minor injuries. Had the boat capsized there could well have been loss of life. A copy of the investigative report (10-343) is attached.

10/5/79

MEMORANDUM
To: Superintendent, VOYA
From: Rainy District Ranger
Subject: Attempt to Recover Disposal Unit Lost Overboard 9/24/79

On 10/3 we attempted to recover the YACC Disposal Unit. The divers located it, but had difficulty due to strong currents in its immediate vicinity. There seems to be quite a volume of water moving through the Brule below the surface.

Apparently the disposer is still working. One diver lost a fin into the unit and reported that he was almost pulled into it. Also, the cable that was attached to the unit's housing apparently got pulled in. Just as the divers surfaced and gave the go-ahead to start winching the unit to the surface, the cable tightened and began pulling the barge down. The cable had to be cut to keep the barge from taking on water. After that, the divers refused to try again.

My recommendation is to get technical assistance from the company prior to a second recovery attempt. A copy of the Case Incident Report (10–343) is attached.

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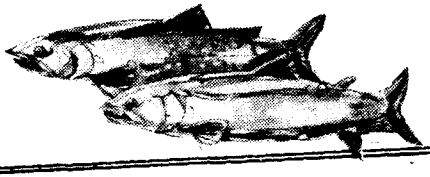

2/12/80

MEMORANDUM
To: Superintendent, VOYA
From: Chief of Maintenance
Subject: YACC Project, 1980

The primary Young Adult Conservation Corps (YACC) for 1980 will again be garbage-dump clean-up and cabin removal. We will be using traditional methods of disposal which will be more time consuming than last year.

We have been unable to recover the YACC purchased disposer that was lost overboard, and it doesn't appear that we'll be able to purchase a new one.

We have been authorized 12 YACC positions for 1980.

4/15/80

MEMORANDUM
To: Superintendent, VOYA
From: Chief of Maintenance
Subject: Recommendations Concerning Disposal Unit Lost 9/24/79

As you know, we have been unable to contact the manufacturer of the YACC disposer lost overboard in Rainy Lake last summer. We wanted assistance in removing it from the lake, as well as having interest in replacing it and/or acquiring a second unit.

I've spent quite a lot of time trying to track the company down. It seems they moved shortly after we purchased our unit. The Better Business Bureau in Vista Nada, California says there are a number of other people or agencies trying to find Nothingness Unlimited. One agent for the Better Business Bureau said it was as if the company, "vanished into thin air."

My recommendation is that we survey the disposer and resign ourselves to slower, conventional methods of disposal.

. . . and so the disposal unit was surveyed (that's governmentese for "written off and forgotten"). That was the end of it as far as most of the staff was concerned. (Except for the clean-up crew supervisor who really missed the disposer.)

The first indication of something unusual came from the Rainy District Ranger, and even then it didn't seem. . . .

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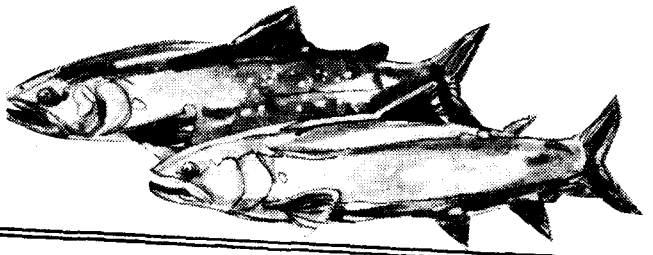

MEMORANDUM 1/20/82
To: All Employees, VOYA
From: Rainy District Ranger
Subject: Hazardous Ice Conditions

This is to advise that there is an unusually large area of bad ice near Brule Narrows. The Brule has enough water flowing through it that it is usually one of the last areas on Rainy Lake to ice up enough to allow safe over ice travel. This year it is slower than normal despite the past 2 weeks of lows in the $-20°$ range.

Please check with me for details before taking any park-owned vehicles or snowmobiles beyond Cranberry Island.

. . . I started to wonder. The ice in the Brule Narrows was even worse in the winter of 1983/84.

Since the summer of 1979 there has been an almost complete turnover of park staff. There's nothing unusual about that. Transfer of park personnel often goes in spurts. But we've got a new Superintendent, a new Rainy District Ranger, a new Chief of Maintenance, and for that matter, there is only one laborer on the staff who worked with the disposer. And the new staff doesn't want to talk about it.

Then, last winter I was going through some files and came across a misfiled page 17/18 of the Owner's Manual for the Nothingness Unlimited Model 341C Commercial Disposal Unit. The last paragraph on page 18 states:

"A small leakage of atmosphere into the unit is necessary to provide the power for the housing unit. The unit should never be placed in a tightly closed area because the air pressure will drop over a period of time. Power may be tapped from the housing unit (115/230 V) by requesting an optional" (That's where the page ends.)

But it got me thinking, if the atmosphere can (and is supposed to) leak into the unit, what happens when it is immersed in water? Will the water (which is made up of more densely packed molecules than the atmosphere) leak into the black hole at a faster rate than air? If more and more matter feeds into the black hole, will the rate of accretion increase? Will the black hole increase in size and will its accretion ability increase? Can it swallow its housing unit and get loose?

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So I started looking for the rest of the owner's manual, but no one seems to be able to find it or remembers where it was filed. The Maintenance Chief says he gave it to Administration before he left the park. Administration claims they never got it.

When I couldn't find the owner's manual, I started looking for other information on the unit in the park files. It's all gone. Every piece of correspondence, the purchase order, the memos, everything. Even references to the memos.

The information that I have is all copies from my files. I didn't plan on keeping copies of all this stuff, it's just bureaucratic habit, I guess. Like I told you, I've got copies of almost everything.

I'm writing to you because I've run into non-interest, apathy, and in a few cases hostility, every time I raise the subject of the disposer. Maybe you can answer my questions and let me know if there's really a problem, or if I'm just making a mountain out of a molehill.

Sincerely yours,
Jerome Heldridge

P.S: In looking over this letter, I see I forgot to tell you something important. Last fall I was canoeing to Kettle Falls on Rainy Lake. I was caught in a late afternoon storm and had to beach overnight on an island near Brule Narrows. It stormed a good part of the night, then blew itself out.

The next morning I was up before dawn, and out on the lake just before sunrise. It was one of those incredibly still mornings. You could see your breath and the lake was smoother than glass. I was canoeing toward Kettle Falls and the rising sun was just skimming the water's surface; anything that broke that mirrored boundary between the lake and the air was magnified.

I was just outside of the marked navigation channel for the motor boats when I saw what I first thought were ripples from a fish rising. But the disturbance in the water's surface persisted and didn't grow larger as ripples should. It was only the combination of the still, still lake and the skim light that allowed me to see it there, in the middle of the lake, just a few feet from the buoyed navigation channel.

It was very gentle, barely disturbing the lake's surface. But it was definitely there. A whirlpool.

Last winter was colder than usual. Brule Narrows didn't ice over at all.

Sure wish we could help, but we haven't been able to contact Nothingness Unlimited either. If anybody from that company is reading this, please contact us or Mr. Heldridge (c/o Analog) at once. This looks urgent!

The Editor ■

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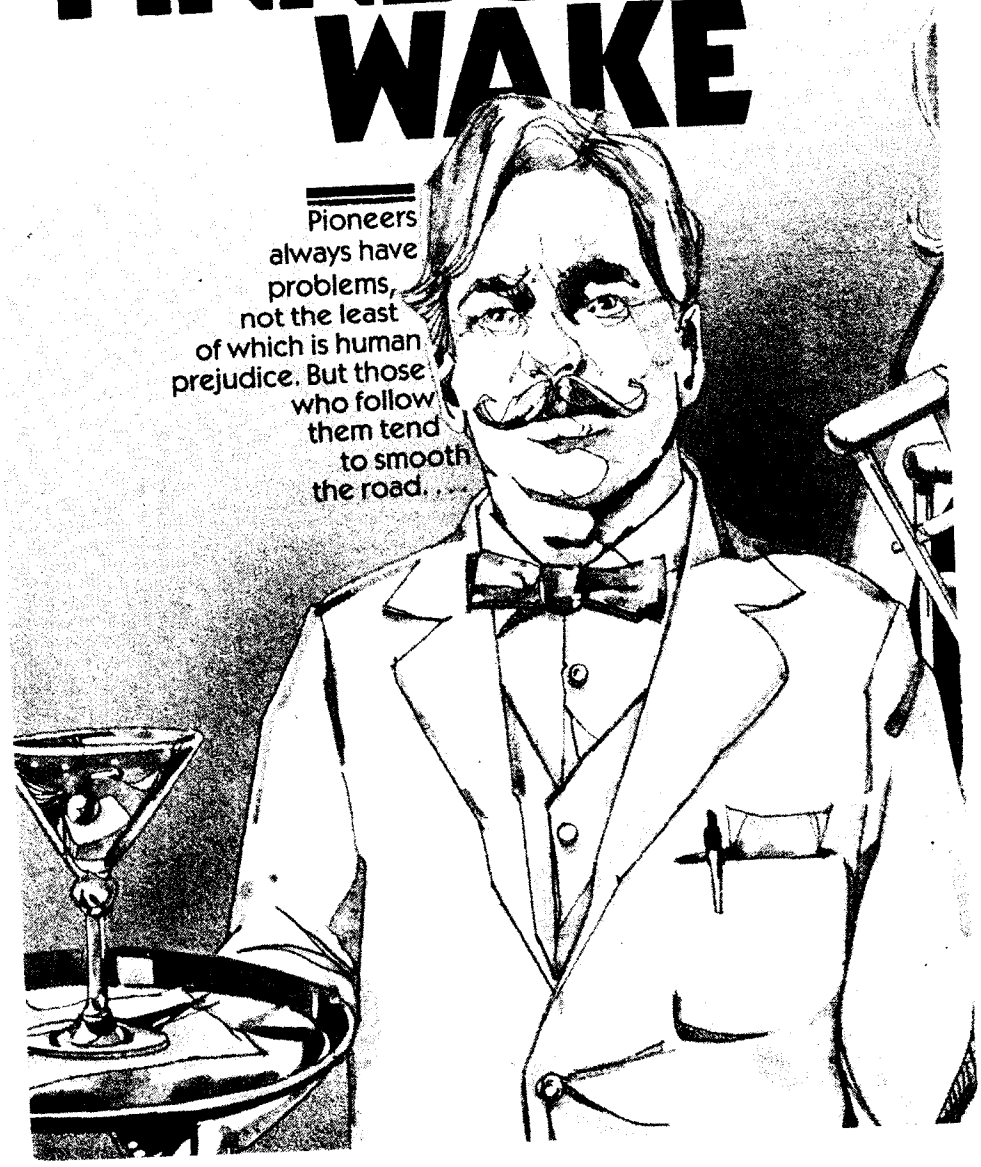
Jayge Carr

FINNEGAN'S WAKE

Pioneers always have problems, not the least of which is human prejudice. But those who follow them tend to smooth the road. . . .



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Whack! Hurrah! Now dance to your partners,
Welt the floor, your trotters shake;
Isn't all the truth I've told ye,
Lots of fun at Finnegan's wake?

Irish folk song

He was a five-day wonder in a blasé world, and then forgotten. Almost. The almost was enough to keep him on the run, to spoil his efforts for a taste of normality, but he got used to his situation; and as time went on, and certain skills improved, there were freaks freakier than he was to attract the public eye—and public opprobrium. But by then, the damage was done.

"Usual, Frank." The crippled man limped up to the bar, propped his cane against one of the brass bosses that was at a convenient height, and lowered himself painfully onto the comfortable seat.

"Coming right up, Abel." Frank-the-bartender had reached for the ingredients as soon as the door opened to reveal Abel, his face clear lit and highlighted in blue by the outside lights. With the orchestrated grace of a Nureyev, he now salted the rim of the glass, sliced a lime and slid it on, opened the bottle of tequila and poured a generous measure before the crippled Abel had finished maneuvering himself into his seat.

"Thanks, Frank." He took a long pull, looked around. "See the gang's mostly all here."

"Horry isn't." With a significant cock of the brow that barely showed above his old-fashioned tortoise-shell framed glasses, Frank tapped the transparent canister with the slit in the lid and a crumple of bills showing in the bottom.

"Ohmighod." Abel sagged a little. Then: "How bad?" He was already pulling his wallet out of his pocket.

"Flare-up," Frank informed succinctly, anonymous barkeep's face-featured face stolid but the eyes behind the thick lenses compassionate. "Minimum two weeks in, with therapy and chemo, probably no op but it's possible."

"Shit," said Abel viciously. He had started to put his wallet back, now he pulled it out again and added more bills to the wad in his hand. "You matching again?" he asked.

Frank nodded. "Anybody who chips in more'n the price of his drinks gets 'em on the house."

"Yo." Abel considered, added another couple of bills, stuffed them through the slot. "That's all I can spare, but I get paid Wednesday. I'll drop in then."

Frank nodded again. "Thanks. For Horry."

Abel's mouth twisted. "If we don't help each other, who will. Besides, it may be my turn one of these days."

"So." Frank shrugged, and there was a tiny protesting metallic *skreek*. "The same for all of us. You made it through today. You can thank God for another one."

"Yeah." Abel glanced down at his crippled leg and grimaced.

"You're alive."

"Half of me is, anyway."

"Better'n some of us, brother, better'n some of us." He moved to top off Abel's glass, and there was the *skreek*

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again, and noise like wheels scraping over floor.

"Yeah." Abel's gaze flicked around the generous sized bar. "Yeah."

As if his gaze were her cue, a woman who had been talking with Twitchy, one of the bar's oldest regulars, slid out of her seat in the booth, smiled down and said something softly, and slithered up to the bar proper.

Both men watched her move, with male appreciation for female structure that was all where it should be. She was a brunette, hair cut short but framing her face in soft waves, Robin's-egg blue dress draping softly, ladylike in cut but not being mean about hiding all her good points, either.

"Hello." Her voice was what they might have expected, soft and mellow, with just the merest hint of a husky undernote of sensuousness. She slid neatly onto the seat next to Abel. "I'm new in town. I'm looking for—friends."

The two men looked at each other, Abel's eyebrow rising, Frank impassive but with a glint in his eyes. "I think, lady," Frank said slowly, "that you've picked the wrong place. Most of the men here—"

"I said," the husky note was stronger, but now it was anger, not passion, "friends."

The two men looked at each other again. Then Frank said, still impassive, "That might be even more—difficult. Here."

Her face stiffened until it was as impassive as his. "Why don't you let me and my—potential friends—decide that for ourselves—" With a snap: "—barkeep!"

"Lady—" Even more of a snap than she'd had. "—I own this place. And I want to keep it a happy place for my—customers. I'll do—a lot—to keep it that way."

She reared back, drawing in a snorting breath through her nose—and relaxed. "Why won't you even give me a chance to see if I'll fit in?" she asked softly, persuasively.

He gave her a slow, male, up and down survey, from the soft black hair, smooth, lightly tanned skin stretched over features neatly balanced, pleasant, the slim, graceful figure. Then his gaze spread out, slowly went around the deliberately dimly lit room.

Abel with his cane.

Twitchy, victim of a nerve degeneration disease, incurable, permanent victim of the shakes.

Louise, another nerve degeneration victim, in her chair with its eye-movement controlled motor and artificial arm now bringing her glass up to her mouth.

Angel the albino, with his thin white hair and pink eyes. Outside the bar he wore a wig and contacts, here he could be himself—and still be accepted.

Marcy and her prosthetics. Jungle Jim, eight foot two, a hundred and fifty pounds, victim of a glandular imbalance. Harry, Indigo, Dixie, Princess—all crippled, medical problems, freaks—

And this woman, attractive without being strikingly gorgeous, youngish if not young—and whole. Unscarred. *Normal*.

"Please?" It was so soft he almost didn't hear it. Then she smiled. But it wasn't a commanding, sexual, I-can-wrap-this-man-around-my-finger smug and confident smile. It was a tentative, coaxing, please-give-me-a-chance smile.

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Frank melted. Men have. Men do. Men will. Even if they regret it later. He smiled back. "All right," he said. Then, momentarily stern: "One chance." It was a warning. Too many of his customers were—vulnerable.

She seemed to understand without his saying any of it aloud. "I'll be careful," she said, still softly.

Frank nodded.

"Wow." Abel let out the breath he hadn't even realized he had been holding in a low whistle. Frank had *never*—

She turned the smile on him and he glowed. "Hi. I'm Elsa Lancaster. And you're—"

"Abel."

"Hi, Abel. Abel . . ." It was a question. Then she saw his expression, and altered what she was saying, finishing it as a statement. "Abel's as old-fashioned a name as Elsa. That gives us something in common."

"So it does. Can I buy—" Then he remembered that he'd stripped himself for Horry's jar. Frank nodded almost imperceptibly, and Abel relaxed and finished it. "—you a drink, Elsa?"

"I'd love that." Another of her patented, make-a-man-feel-like-a-*man* smiles. "On condition—" A playful pat on the arm. "—that you let me buy you one later."

"Uh." He flinched. Then, awkward: "I wasn't trying—"

She patted his arm again. "I know. But I did want us to be friends, and—" The smile spread out to include Frank. "I've a better idea. You can buy me a drink on condition that Frank lets me contribute to Horry's jar."

Frank's brow went up. "You don't know Horry," he denied.

"Horry, whoever he or she is, needs help, or you wouldn't have that jar sitting out. I'm here, and now I'm aware, and I'd like to contribute. No man is an island, Frank, Abel. No woman, either."

Slowly, Frank pushed the jar toward her, until she could drop the bills she had pulled out of her purse through the slot. Then he smiled. "Welcome to Finnegan's Wake."

Elsa came to Finnegan's Wake every night for a week or so, then settled into an irregular routine, sometimes two or three nights running, sometimes every other night, or every third or fourth night. She quickly became very popular, a tribute to her tact and other virtues. She should have been ostracized, despised, with the flinching away always accorded the different, even if it was a reversal and the different was the only normal. She drifted from table to table to bar, she listened, she talked, she was always good for a smile or a shoulder to cry on, a bit of cash or a succinct, set-your-head-straight comment. Gradually she faded into the crowd, and the rest forgot or forgave that she was different, normal.

"—Stupid nits," Twitchy grumbled, nervous fingers worrying one of the brass bosses edging the burgandy leather English pub seat-covers. "I warned 'em, I did. Told 'em that that kid was too much like me at that age. Told 'em if they pushed too hard he'd—"

Elsa murmured agreement.

"—raised that son of mine, didn't I know the signs—"

* * *

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"Elsa, come here and settle this, will you?"

"Ah, she's too young to remember the election of '96, much less to have voted in it."

"She's a poli buff, and—"

The blobbily distorted face, like a carved wax mask melted by heat, couldn't get red, but the eyes glinted angrily enough to make up for it. "I don't care if she can rattle off every president since Washington, '96 was the first election I voted in and I *know* I voted for Mailer—"

Louise was almost totally paralyzed, but she bristled with all the aggressive fury of a fighting cock, until the approaching Elsa could almost see a scarlet comb erect and pulsing, hear the angry squawks, the clacking beak. "Mailer didn't run for President until two thou, I know because that was the year I got my first voice-command pros. And how anyone could have voted for that blockhead—"

"I was married, you know, the whole bit, kids and all. And you know what that bastard did, when the diagnosis came through?"

"He didn't stick by you." It wasn't a question.

She laughed, short and bitter. "Not even until I got out of the hospital, that first time. Came back, and our apartment was stripped. Andy gone, kids gone, everything gone." She gulped her beer, said, almost on a sob: "*Everything.*"

"Dixie—" Elsa caught the older woman's glass, a gentle, unspoken plea: Don't drown yourself in this. "Some people just can't handle tragedy. They run from it. His running may have been because he loved you too much, not too little."

She snorted, shook the hand off, and drank, loudly. Then, sardonically: "You really believe that?"

"No. But it's a possibility. And it's kinder to both you and him."

"Kinder?" She slammed her glass down so hard that beer spattered out of it, though it was close to empty. "I haven't seen or heard of them since. The baby—the baby'd be about your age by now. And I don't know—" A tortured breath. "—*anything.*" Another breath. "Elsa?"

"What, Dix?"

"You sure you're not my baby—grown up?"

"I'm sure."

"You don't know what it's like. Walking down the street, seeing kids, wondering. Could one of them be mine? Are mine all right? Are they even alive? What did losing me do to them?"

"Dix, I know what coping with tragedy and disaster is like. But people are resilient. They can lose what they love, lose everything—and come through and survive. I did. You did. I know I can't be your daughter. But if you want to look at me, see some little part of her, or yourself, in me—"

Elsa often remained until late, but she never left with anyone. So it was almost a shock when one night she out-stayed everyone else, winding up at the bar facing Frank, who was wiping the crystal wine glasses before setting them up on their special shelf. The rest could be washed in the automatic, but the crystal goblets got special care.

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"Frank," she said softly. "I stayed after for a reason."

"Oh?" Then, muttered: "Look, Elsa, I can't—"

"Oh. I just wanted to say—Good-by. And—thank you, for what you've done, for—for making me welcome."

"If you feel like that, then why—"

"I . . . it's a—long story. Have you time?"

"Elsa, for you I have—*almost* anything."

"You see, I'm looking for a man."

"Aren't most women?" He put the last glass on its shelf and hung the towel by the sink, the soft but ever-present *skreek*-wheel clatter as he moved about an accustomed chorus.

"A particular man."

"Mr. Right."

She laughed. Then: "I suppose you could say that, in a sense. The trouble is, he has reason to run and hide. Tracing has taken a long time and a lot of false trails. One of them seemed to lead here. Only—"

He froze, dripping hands poised over the sink, the soap slipping out of one.

"Only I've met everyone by now, I've asked discreet questions, and I've met everyone."

"Except—" His glance went up to one shelf, where five glasses, all different, a beer stein, a martini glass, a champagne goblet, two she couldn't identify easily sat, turned over with their bases up.

"The regulars who've died." She knew, she'd been asking all along. "I checked them out, too. One by one, I've found proof—one by one, until there's no one left. It's just a false trail, Frank, and I have to go back now and try again."

"You're stubborn. And patient."

Her finger traced a ring in the moisture where he'd just wiped the bar. "I have to be. There's nobody else."

"I envy him, whoever he is. If it were me, and I knew somebody like you was looking—"

"He'd run if he knew anyone was looking, Frank. But he doesn't know me, doesn't know at all about me, that's what I'm counting on."

He pulled back down one of the just-washed goblets and filled it with Pouilly-Fuisse, a light white burgundy that was her favorite, that he had taken to stocking for her. "Wet your throat and tell me—whatever you want to talk about."

"Finding this man and why I have to and why he's running. That's a lot longer story than just I'm leaving because I have to trace another maybe-false trail for someone I need to find."

There was a skreek of wheels and he settled down a little lower. "I'm comfortable. I can sit like this for hours," he informed with a grin.

"Frank—I—you won't say anything to any of the others."

He held up his hand like somebody about to swear on the Bible. "Bartender's oath. I'll tell them something to keep them from worrying, that's all."

"All right." She took a sip. "The story starts with a medical miracle."

He snorted. "We deal in 'em, here."

"This one was—special. Back when, there was—an accident. A biggie. Lots of people involved." He topped off her glass silently. "No survivors; nobody even close to being revivifiable. It happened very close to a hospital, and the

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hospital ambulances came out and froze everything that looked useful. SOP, you find a separate piece, freeze, you might find whoever it belongs to in a minute and the techniques for reattachment—''

''I know,'' Frank said, in an agonized voice.

''And, of course, if the part isn't claimed, it or some of it might be useful for a graft— Frank, what's the matter, you look ready to faint.''

''Sorry,'' he said. ''Bad memories.''

''Do you want me to stop?''

''No.'' A little laugh. ''I've heard worse, only this one—hits a little close, to, y'know, home.''

''I am sorry. There's not much more. There were no survivors, and most of the pieces were unidentifiable, anyway. Well, one of the doctors had an idea. A lot of the victims had signed graft releases, you know, if anything of mine is useful after I'm dead, use it. And the families of some had been contacted and had signed releases. He had a lot of parts, more than they really needed, with so many prosthetic and cloned parts available. So he decided—Frank, are you sure you're all right?''

He nodded, shame-faced. ''Later than I thought.''

''That's all really. The doctor thought it would be a marvelous exercise in technique to try to fit some of those spare parts together, make a survivor out of them.''

''My God!''

''And once they had a frozen, sewn together man, they had to finish the experiment, and try to revive him.''

Frank stared at her speechlessly, eyes wide behind the thick lenses.

''The brain was a patchwork like all the rest, he had no personal memories, or such confused ones that they used drugs to wipe them out. But a lot of the rote-learned things came through. He wasn't a baby in a man's body, he could speak, he could walk. He was very confused, but he was intelligent, and what he'd lost, he re-learned quickly.''

''There was quite a fuss about him at the time,'' he said, nodding, face still pale and with frown lines deeper-graven than she'd ever seen. ''But it was a long time ago.''

''You'd forgotten until I reminded you. Most people have.'' He nodded again. ''There was a lot of publicity, there were a lot of kooks, and fanatics, there was abuse, and suits and countersuits, and enough pressure to drive the sanest man to drink or worse. He ran.''

''Don't blame him.''

''And hid, and he's stayed hidden, ever since.''

''And you want to find him and start the whole mess all over again. I thought I knew you better. I wish you bad luck, and wish him that you never find him.''

She flinched back, as from a blow. ''You think I'm a reporter or something, I want to drag up scandal because there isn't enough new, make my name and fame out of somebody else's tragedy.''

His lip curled. ''That's the nice one,'' he said bitterly. ''The kooks come from the woodwork out.''

''Frank!''

Grimly: ''Ask anybody here. If there's a one who hasn't gone through it at least once, I'll be surprised.''

''Frank—'' She caught his arm over the wide bar. ''If all I've said and done these last months hasn't proved I'm, not one of *those*—''

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"Then what?" He pulled his arm away.

She swallowed, licked her lips. "I—I can't tell you. But there's a reason. A good reason."

"You told me *his* story."

"I told you what was the lead story on every newschannel. Public knowledge, though most people have forgotten it, long since. But I can't tell you—"

He shrugged, and there was the tiniest creak of wheels. "I see. Under the circumstances, you can't expect me to wish you luck, can you."

"I don't need your luck. I'll find him, because—I haven't any choice. And someday, we'll come back, both of us, come here, and he'll tell you—how glad he is that I found him."

He smiled at that, a genuine smile. "That'll be the day," he said genially, "but I won't be holding my breath."

"I'll find him," she repeated. "Someday."

"Sure." He smothered a yawn. "If you say so, Elsa. Now, if you don't mind, I'd like to lock up."

"Yeah." She slid off her stool and turned. "Good-by, Frank. I'm sorry it has to end, I'll miss you."

"I'll miss you, too." He sounded almost surprised. "Good-bye, Elsa." He pushed a button on the bar, and the script name of the bar in the window —backwards to her, of course, so she couldn't read it, though she knew what it said, having glanced at it a hundred times on her way in—changed from solid blue to blinking, while below it, the large block NEPO changed now to D SOLC.

"Closed," she muttered aloud. "Dead End." Louder, "Fix your E, Frank, it's out."

"I know. Got a man coming out, y'know how it is," he answered from behind the bar. An opaque drape was sliding across the window, hiding the script and the D SOLC from her. "No emergency, anyway," he added. "People don't notice, see what they expect to see."

She froze, one foot almost to the burnished wood floor. *See what they expect to see!*

An E in the word CLOSED.

A bartender in a bar.

"Frank." She spun around. "This bar, Finnegan's Wake, it's been here thirty or forty years. But how long have you been here?"

"Me?" He grinned. "Frank Finnegan? Most of that time. My Uncle Tim owned the place, I was in and out as a kid, he decided to retire about the time I had saved up a bit and was looking for a place of my own—"

"Ye-eah," she said slowly. "That's what they told me. That you bought from your uncle, that being crippled yourself, you slowly gathered a clientele of similar cripples, medical freaks, whatever. The old-timers, the original clientele, the ones your—uncle amassed, they drifted away, or died, or whatever. When did you buy your—uncle out, Frank?"

He made a pursed-mouth face. "God, I have to think. Thirteen years ago—no, fourteen. Why?" There was sweat around his receding hairline.

"Funny. Most of the regulars have mentioned when they started, makes a good story, and the longest any of them has said they've been coming is eight or nine years.

"Well—" Shrug, skreek. "—I didn't do this deliberately, you know. Not at the beginning. Didn't look for crips—"

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"I think you did. I think you bought this bar eight or nine years ago. I think the name amused you, because you knew what happened at Finnegan's Wake. I think you picked the name Finnegan, just like you picked the name Frank, because they had amusing connotations."

The line of sweat was bigger. "I don't know what you're talking about."

"What happened at Finnegan's Wake?"

"I've never read Joyce."

"I'm not talking about Joyce, I'm talking about the original, the Irish folk song he took his title from. Finnegan's Wake. About an Irish drinker named Tim Finnegan who falls off a ladder and dies. So they hold a wake, an Irish wake, a rowdy Irish wake, a brawl, a brannigan, a—and somebody breaks a bottle over Tim's head, and the taste of the liquor brings him up, Tim arises—" Taut, poised as a hunter ready to jump when his prey does: *"Come out from behind that bar, Frank!"*

"No!"

"I'll come in!"

"It's locked!"

Successful hunter's triumphant smile: "I'll climb over. What are you hiding behind that bar, Frank? Nobody's ever seen you outside it, seen more than your chest and shoulders and heard wheels creak every time you move. Come out, Frank—or I'll come in!"

"Dear God!"

"Now!"

He moved slowly, without his usual ease, the wheels a soft accompaniment, until he reached the end and came out. Standing, back to the bar, shoulders stiff.

She smiled, looking him up and down, slowly. The so-forgettable face she was familiar with, the blue shirt with its old-fashioned cuffs held with the glittery sideways eight links, the top of a pristine white apron—

And below, the rest of the apron, a pair of darker blue slacks on two legs, though one seemed a fraction longer than the other, he was standing with his hips askew, just a little.

"Walk, Frank."

He took a step toward her, limping almost imperceptibly. The wheels sounded loudly.

"What makes the wheel sound?"

"A mini-recorder." He patted his left hip pocket, where there was a small lump—and the wheel sound came again. "Movement triggers it."

"Why?"

He shrugged, the recorder did its *skreek*, and he frowned and stuck his hand in his pocket. There was a soft click. "Medical miracle. I shut down while I was in the hospital, told the gang it was a final check-out. But when I came back out—I was afraid, if they thought I wasn't—wasn't—so I kept it up."

She smiled, took a step toward him. "You have your lies thought out in advance, don't you, Frank."

He swallowed.

She put her arms around his waist, laid her head on his chest. "I'm glad it was you, Frank."

"Oh, God!" He tried to shove her away. "Don't you understand, woman? I'm him, all right, the freak, a worse freak than any one else here. At least they're human. I'm not, the Frankenstein, the patchwork man, the living scrap pile. *Elsa*—"

She looked up, smiling, though tears were running down her face. "Frank—" She reached up, kissed his muscle-knot-

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ted jaw.

"Elsa—" He was a man close to breaking. "Don't you understand, listen, I can't. I—"

"Can." She was almost unbearably smug. "I talked to the doctors. They put you all together, and *it all works!*"

"It doesn't matter," he snarled, trying to unwind her arms from around him. "I'm the one man in the world who daren't even think about touching a woman, God knows what the results would be—"

"Are you worried about that." She kissed his jaw again, happily. "Don't be. I can't have kids, ever. So—"

"Elsa. Don't you understand. I'm not a person, I'm a thing, and I can't let a real person—"

"Frank." She put her hand over his mouth. "It's you who don't understand. You've forgotten what doctors and scientists are like. They demand perfection. And you work, every bit of you, but you look—you must have had plastic surgery, your face—"

"All of me," he said grimly. "I look normal, or I do when you're not hunting for the signs." He grimaced. "I decided early on if people were going to make fortunes out of publicity about me, I was going to be one of them. I sold my as-told-to story, it paid for a lot of surgery—and, eventually, this bar."

"Ah." She nodded. "I knew there'd been a flood of personal-interest stories, I hadn't read them all, hadn't realized one was genuine, an as-told-to. Clever."

He put his hands on her shoulders, pushed her back. Between his teeth: "It doesn't matter. What matters is—you—have—to—go."

Her eyes twinkled merrily. "You forgot about the doctors. The perfectionists. You work, but they decided they could do a better job. Next time. And when next time turned out to be a chartered shuttle crash, full of women on their way up to the L-5 Hilton for a Pendulum Party political convention—"

His jaw dropped.

"Ninety-five percent of the victims were female. So naturally, when the doctors put together their little work of art, it—she!—was female—"

"Ahhhh—" He drew in air on a long gasp.

"Amazing how alike our minds work. You rooked the newshawks who were flaying you. I settled out of court—they wanted no publicity just as I did—with the hospital and a consortium of insurance companies. Every one of those women had had a career, a fine one; I had none. Even after I paid the lawyers, I had plenty to live on."

"And to pay detectives."

"And to pay detectives. I had to find out what my origins were, didn't I? And to find you."

He didn't say anything.

"I said how alike our minds work. I couldn't see myself with an ordinary—a normal—man, either. But then, I've known about you all along—but you didn't know about me."

"No."

"You might have guessed sooner, if you had. Elsa Lancaster was the actress who played the Bride of Frankenstein, in the earliest picture that had a female Frankenstein in it." She smiled, lifted his hands off her shoulders so she could slide inside them. "Elsa Lancaster and Frank Finnegan. Two of a kind."

—Lots of fun at Finnegan's Wake! ■

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on gaming

Dana Lombardy

In 1995, World War III began. For two years, both the Warsaw Pact and NATO forces used only conventional weapons, but eventually tactical nuclear devices came into play. Three years of limited nuclear warfare changed the political and social structure of Europe; manufacturing levels are roughly those of the end of the Nineteenth Century. It's survival of the fittest for both civilians and military alike. It's now the year 2000, and you are a NATO soldier whose unit is cut off behind enemy lines in Poland. The last message from headquarters was "Good luck. You're on your own."

Twilight: 2000 is a new role-playing game by Game Designers' Workshop that puts you into this holocaust scenario ($16.00 at your local store, or direct from P.O. Box 1646, Bloomington, IL 61720-1646). Male and female players start with six basic attributes: Fitness (your character's strength in proportion to his size); Agility (coordination and nimbleness); Constitution (physical stamina); Stature (physical size and bulk); Intelligence (ability to learn—not the same as common sense); and Education (years of formal education).

Using these attributes, you can calculate your character's Strength, Hit Capacity (damage your character can absorb), Throw Range, Weight, Load (carrying capability), and Military Experience. Your character also has combat experience, "Coolness Under Fire," Age, Languages Spoken, Rank, Specialties (such as radio operator or driver), and Skills (such as being a good shot).

Your team must scheme, maneuver, and fight its way back to your own lines. Despite *Twilight: 2000's* somber theme, the game plays well and requires the characters to use their wits for survival in a realistically drawn post-nuclear exchange world. The game includes a 24-page Player's Manual, a 36-page Referee's Manual, one 10-sided die and four 6-sided dice, a color map of Poland in the year 2000, Character Record Sheets, an equipment list, charts, and a beginning adventure: "Escape from Kalisz."

Even limited nuclear war has seriously altered life in Europe. None of today's "miracle drugs" are available; disease and famine are rampant; and sudden death is a daily possibility. The enemy is everywhere; sometimes he even wears a NATO uniform. Many military units on both sides have turned renegade, taking what they need from whomever they can. Replacement parts, gasoline, ammunition, food, and medical supplies are no longer available through normal chain of supply and command. If a unit's armored personnel carrier is out of fuel and another, weaker, unit comes along with gasoline still in their vehicle . . . well, dead troops aren't going anywhere, so they don't need gasoline.

Combat is resolved simply, with three

(continued on page 121)

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The Alternate View

IN THE FULLNESS OF TIME

John G. Cramer

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"Did anyone read on the front page of the Times that matter is decaying? Am I the only one who saw that? The universe is gradually breaking down. There's not going to be anything left. I'm not talking about my stupid little films here. Eventually there's not going to be any Beethoven or Shakespeare or . . ."

Woody Allen
"Stardust Memories"
(1980)

Consider the passage of time. In one year the Earth will have gone through a complete cycle of the seasons, there will be a few notable historical events, some important scientific discoveries will be made, 2% or so of the population will die and a new 2% will be born, there will be a few major events and minor wars. In one hundred years our civilization will have dramatically changed, our scientific knowledge and technological capabilities will be vastly different, nations and institutions will have disappeared and been replaced by others, and, in the absence of some life-extending medical breakthrough, none of us will be around then to watch the fun. In ten thousand years our decendants may be travelers among the stars or savages struggling in the grip of a new ice age. In a million years, humanity may have evolved into a completely new species, or may be long extinct. But modern cosmology leads us to believe that the Universe will continue not for 1 or 100 or 10,000 or 1,000,000 years, but **forever**. There is fairly good evidence (see my column "The Dark Side of the Force of Gravity" in the February, 1985 issue of *Analog*) that there is not enough matter in the Universe to reverse the cosmic expansion which started with the Big Bang some 16 billion (16,000,000,000) years ago. It would seem that the Universe is going to continue expanding into eternity.

Eternity is a long time. Much can happen in an infinite amount of time. The consequences for the universe of infinite time, infinite expansion, and infinite aging have been carefully considered by Prof. Freeman Dyson of Princeton's Institute for Advanced Study, and I want to share some of his conclusions with you.

The problem of discussing very long times is that we don't really have a frame of reference for time which allows us to comprehend such enormous durations. As a start, let's manufacture a very long unit of time which we can use. The present age of the universe, the elapsed time since the Big Bang, is about 16 billion years. So let's adopt that period as our time standard: 16 billion years is now one Big Bang second (BB-second) on our cosmic stopwatch, and the Universe has so far ticked off only one BB-second on this time scale. Then we can ask what will happen in a BB-hour, a BB-day, a BB-year, etc. How far into the infinite future might intelligent life survive?

The significant events in the history of the universe so far, star and galaxy formation, synthesis of the elements, condensation of the sun, formation of

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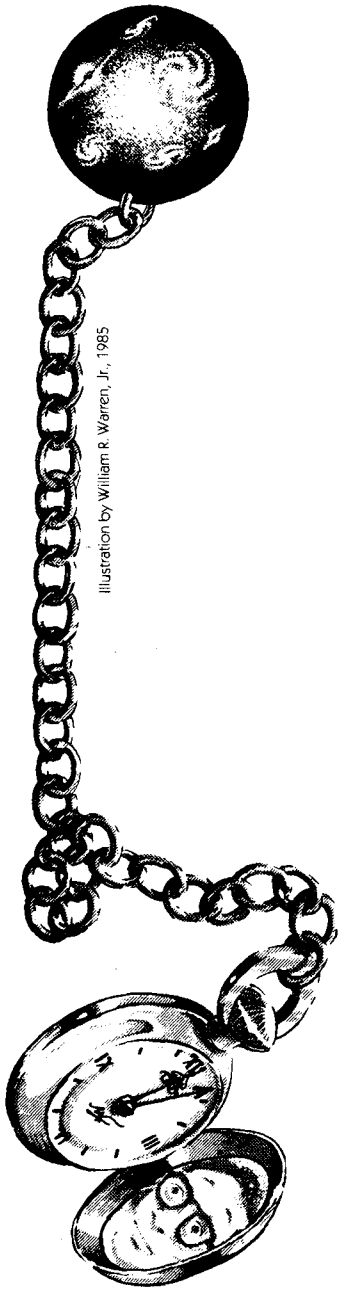

the earth, continental drift, the evolution of life, all are "fast" processes on such a time scale. These events come and go so rapidly that we must ignore them. But on a slower scale other things are happening.

Our sun is a thermonuclear "engine" which is slowly consuming its hydrogen fuel and producing heat, light, and helium "cinders." In a few dozen BB minutes this fuel will all be consumed. Our sun will then become a moribund white dwarf star. In about 2 BB-hours all of the stars in our galaxy will have similarly burned out, becoming white dwarfs, neutron stars, or black holes, depending on how much hydrogen fuel they had at the start. But of course even dead stars can have planets. Perhaps even after the stars go out intelligent life could survive by generating energy from fusion or by dumping matter into black holes. However, in a period of about 18 BB-hours the random near-collisions between the burned-out stars will detach all of the planets from their parent stars.

Near-miss collisions between stars will also, after about 20 BB-years, have caused about 90% of the stars in our galaxy (and other galaxies) to become detached, so the galaxies will effectively evaporate. If by some chance the earth had not been detached from the sun through a near miss from a wandering star before the sun parted company with the galaxy, the earth will slowly spiral into the sun due to energy loss through the emission of "gravitational waves," (a small energy "leak" in the form of a moving gravitational disturbance, which is to gravity what light is to electromagnetism). This will take about 200 BB-years. The Universe by now has become a rather dreary place: the stars have all gone out leaving only a junkyard of cooling cinders: white dwarf stars, neutron stars, and

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black holes. There will be no planets. The galaxies will all have dissolved, leaving only isolated stellar debris. But more is yet to come.

We have now arrived at another time scale problem. Beyond this stage in the future history of the universe the time required for changes becomes so enormous that the (one BB-second = the present age of the Universe) time scale is no longer useful. We will have to revert to a normal time measure and use power-of-ten notation. The Woody Allen quote at the beginning of the column was prompted by a New York Times article announcing the instability of the proton, the fact that recent progress in particle physics indicates that protons can, with a low probability and long half-life, decay into lighter particles, accompanied by a large release of energy. (See my Alternate View column in the July, 1984 *Analog* for a discussion of this). So in 10^{34} years or so, all of the free protons in the universe should have decayed away.

In 1975, Stephen Hawking pointed out that black holes are not stable, as had been previously supposed. Instead, because of the strong change in the gravitational force near the curved outer surface of a black hole, there is an effective surface temperature. All black holes are "hot" and will slowly "evaporate" by emitting light. If the temperature becomes high enough, they will also emit electrons, positrons (antimatter electrons), and even some heavier particles. The smaller the black hole, the more curved its surface, the hotter it becomes and the more rapidly this happens. Large black holes evaporate away so slowly that the effect is undetectable. But a small black hole reaches a vicious cycle in which the more it evaporates, the hotter it becomes, so it evaporates even more, becomes even hotter, . . . The result is that small black holes literally explode, making a grand exit from the universe with a brilliant flash of light and particles. A black hole with a mass about equal to that of our sun is quite "cold" in these terms, so this process takes a long time, about 10^{64} (normal) years. (This time is so large that our previous time scaling trick is useless.) In the words of Dyson, "the cold expanding universe will be illuminated by fireworks for a very long time."

What about the degenerate white dwarf and neutron star remnants formed by stars having too little mass to collapse to black holes? The proton decay process will probably take care of these from within, one nucleon at a time destroying them in about 10^{34} years. But even if proton decay (which has not yet been seen experimentally) fails, there is still a process called quantum leakage which in the fullness of time will destroy them. In 10^{1600} years all of the degenerate white dwarfs will collapse into neutron stars. The collapse of neutron stars into black holes takes a bit longer, about 10 to the power 10^{76} years. (This is a truly enormous number which would have to be written in ordinary notation as a one followed by 10^{76} zeroes) The resulting black holes will evaporate in a time very short by comparison, leaving behind in the universe only light photons, neutrinos, electrons, and positrons. These convert back and forth among themselves, reaching an equilibrium of gradually thinning residue as the universe continues to expand.

Those of you who are familiar with *A Hitchhiker's Guide to the Galaxy* will be interested to learn that the Ultimate Answer to Life, the Universe, and Everything is not 42 after all! Astrophysicists at Pennsylvania State University have recently shown that the

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Answer is one-twelfth of the square-root of 105 minus 3 or about 0.6039. This is the Ultimate Ratio of the density of electrons and positrons divided by the density of light photons in the universe after all the dust has settled, the stars have gone out, and the black holes and dead stars themselves have decayed away. And that is what the end of time will really be like.

So Woody Allen's pessimism seems justified. There will inevitably come a time when art and music, history and philosophy, science and culture have all vanished from the universe, leaving behind only a thin unstructured scum of photons and leptons. This, of course, assumes that there will not be life sufficiently intelligent and powerful that it can intervene to change the odds and hold things together.

Dyson is more optimistic. He gives arguments that intelligent life can adapt to the lowering temperatures of the aging universe and survive indefinitely, preserving and improving science, art, and culture indefinitely in the fullness of time. You can draw your own moral from all this. Mine is that we should try to enjoy the universe while it is still in good condition. ■

REFERENCE

Freeman J. Dyson, Reviews of Modern Physics *51*, 447 (1979).

ON GAMING

(continued from page 117)

die rolls, regardless of whether a character is attacking with a club or an M60 machine gun. The first die roll determines if the weapon hit its target. The second die roll determines where on the body of a person, animal, or vehicle it hit. The last die roll determines how much damage the hit did to the target. An innovative character attribute, called Coolness Under Fire, comes into play in combat, determining how long a character will hesitate before opening fire, tossing a grenade, or taking other action. This reflects the realities of combat in a manner few, if any, other games have done.

Characters are generated by die rolls, but the radomness of this method is offset by the ability to increase one attribute by decreasing another. For instance, a character may take points away from a strong Constitution score to improve a weak Agility rating. The attribute values are used in buying skills, such as melee combat or language ability, as well as in determining a character's chance of succeeding at any attempted action.

Both the Player's Manual and Referee's Manual are easy to read. The Player's Manual, in particular, is filled with narrative examples to illustrate the rules. These are exceptionally well written for a game manual, reading more like excerpts from a good war novel.

Twilight: 2000 is for those gamers who like "what if" scenarios of the near future. It's detailed, innovative, and thought provoking. It's everything a role-playing game should be. ■

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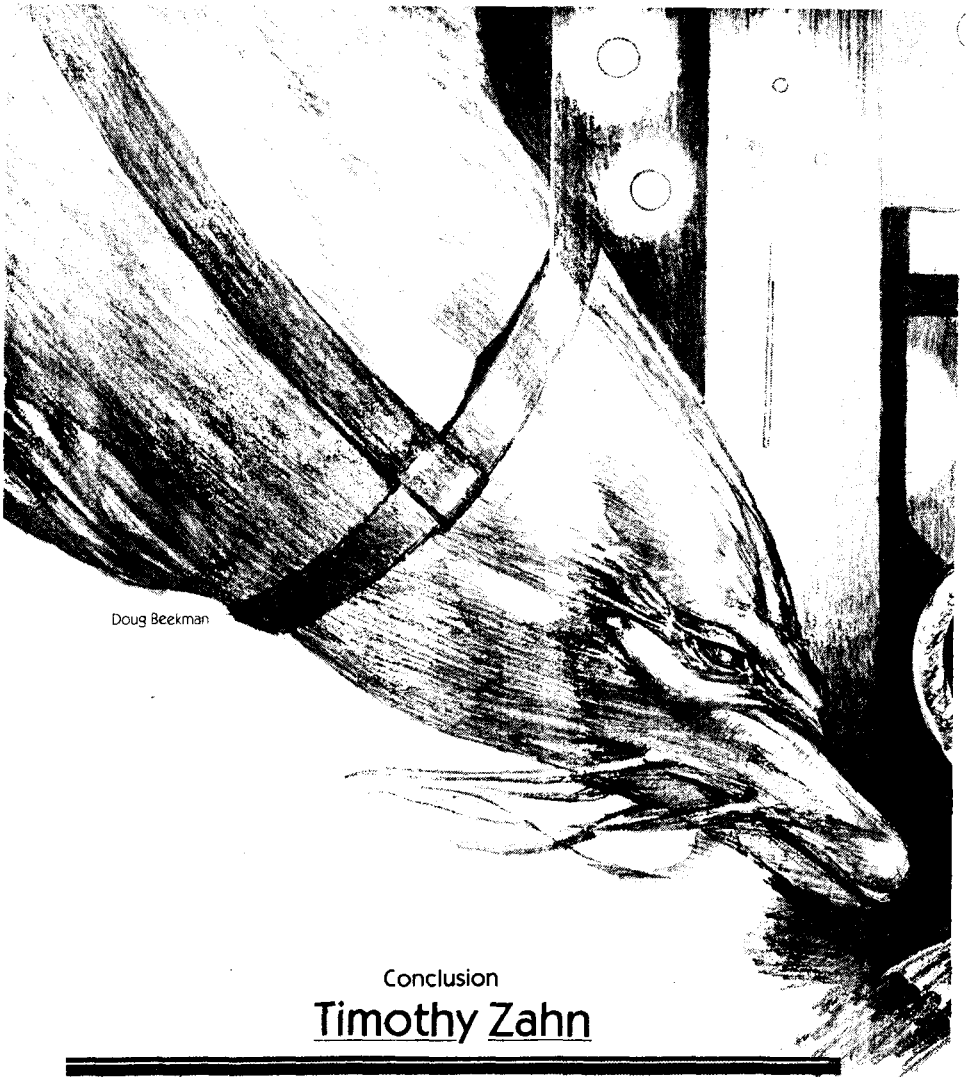

Doug Beekman

Conclusion

Timothy Zahn

SPINNERET

When questions keep leading to bigger questions, the final answers can be very rewarding—or alarming.

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SYNOPSIS

In the year 2015 the United States launched the world's first FTL starships, the **Aurora** *and* **Pathfinder**, *their mission to find new worlds for a crowded and increasingly demoralized Earth to colonize. Their findings were a shock: virtually all oxygen-water planets were already occupied, most of the nearest by one of six different alien empires. One of those races, the* **Ctencri**, *made quick contact with this newcomer to interstellar travel; through them, UN Secretary-General* **Hammad Ali Saleh** *learned of one world which might be for sale or lease. Located within the boundaries of* **Rooshrike** *territory, the planet was considered useless because it contained no detectable metal whatsoever. Saleh persuaded the rich nations to help fund a colony there, while Soviet goading of U.S. President* **John Allerton** *resulted in Allerton's accepting a UN mandate for the development of the new world.*

Ten thousand American scientists, soldiers, and workers were the first colonists to move into the four hastily constructed villages on the world now known as **Astra**. *Among them were the colony's director,* **Colonel Lloyd Meredith**; *a civilian worker on his organizational staff,* **Carmen Olivero**; *a geologist,* **Dr. Peter Hafner**; *and a Hispanic activist,* **Cristobal Perez**.

From the very beginning the colony was beset by disasters. On the colonists' first full day on Astra one of their three Ctencri-built flyers abruptly lost all power in its plasma-jet repulsers and crashed just south of **Mt. Olympus**, *a dormant volcano about thirty kilometers east of the colony. Then, later the same day, a confrontation between some of the predominantly Hispanic field workers in the farming village of* **Ceres** *and the military authorities there was broken up by stunner fire ordered by the local commander,* **Major Dunlop**. *Meredith was furious at his subordinate's quick use of force and took a team to Ceres to investigate. Perez, mistakenly labeled as one of the mob's leaders by Dunlop, refused to talk to Meredith, but was more open in private conversation with Carmen, who had come with Meredith's investigative team. She was stunned by Perez's allegations that many of the Hispanics had been lured into joining the expedition by unfair promise/pressure tactics back on Earth, but simultaneously annoyed by his veiled threats of more trouble if some of the restrictions of military rule weren't eased. Still, in talking later to Meredith, she suggested that he set up a civilian advisory council to give at least the illusion of democracy to the colony. He refused, but agreed to address other issues of unfairness Perez had raised.*

The next day's work had barely begun when an unexpected visitor arrived: **Beaeki nul Dies na**, *one of the Rooshrike from whom Astra was being leased. Meredith gave him a tour of the colony, learning a little about the six-race—or seven, counting humans—trading association in the immediate area. He also learned the Rooshrike maintained a mining base on the hot innermost world of the system and suggested the aliens might want to purchase some of Astra's sulphur once production began. Beaeki promised to pass on the suggestion and left.*

As the first week passed and tensions

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re-emerged, Carmen again began pushing her Council suggestion; but this time she received unexpected support. Hafner, trying to get a flyer to do studies on the Mt. Olympus volcano, agreed to try and build support for the plan among Astra's scientific community in exchange for Carmen's help in getting flyer priority. Meredith, succumbing reluctantly to the added pressure, allowed the Council's formation—but placed Carmen in charge of it, all organizational work on it to be done in off-duty hours. Perez, pleased that his nudges had borne even limited results, succeeded in gaining one of the Council's ten seats.

Keeping her promise to Hafner, Carmen flew him herself to Mt. Olympus, but the results of his study merely deepened the mystery of how an entire planet could form with no metallic elements in its crust.

And then, a month later, all semblance of normalcy abruptly disappeared. In a single afternoon all metal in contact with Astra's surface simply vanished, melting into the ground as if into quicksand. The effect lasted three hours and ended as suddenly as it had begun.

For the already financially strapped colony, the loss of so much equipment was a thorough disaster. Meredith debated with his senior officers about whether or not they should close down the colony and return to Earth, citing in particular the loss of vital trace metals from the fertilized fields. Hafner, describing various geological findings, suggested that the "leeching effect" had occurred several times throughout Astra's history and was, moreover, tied somehow to the mysterious Mt. Olympus. Meredith gave his permission for an expedition to study the volcano, and dawn the next morning found Hafner, Perez, and three others climbing up the slope, while Carmen and one other waited below in their flyer.

But halfway up they suddenly realized that, inexplicably, gravity seemed to be decreasing. Air rushing past them, they headed back down . . . only to find their way barred by a region of heavy gravity that threatened to crush anyone who crossed it. Using the flyer's compressed oxygen supply, Carmen was able to keep them alive . . . and just before the gravitational anomalies went back to normal they all watched as a long silver thread was shot from the volcano into space.

Matching orbits with the six-centimeter-diameter cable, the Aurora *discovered it to be a mass of physical impossibilities. Incredibly strong but less dense even than water, superconducting of heat and electricity even at high temperatures, the cable was in addition coated with a sort of "glue" which penetrated several centimeters into any object that touched it. Ordering the cable parachuted back down to Astra, Meredith sent the* Aurora *back to Earth with news of the discovery.*

President Allerton, immediately recognizing the political as well as scientific ramifications of the report, ordered a team of scientists to be immediately flown to Astra to begin a study of the cable. Saleh, contacted at the UN, confirmed Allerton's fears by hinting the Astran Mandate might be taken back and the alien machinery—dubbed the **Spinneret***—put under direct UN con-*

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trol. Since the UN Secretariat was in charge of all trade with the Ctencri, the threat wasn't one to be taken lightly.

The secret didn't last long. The Ctencri trade representative, learning about the **Spinneret** through bugs in Saleh's office, spread the word to the rest of the nearby races, planning to gain agent status for any sales that would come from the new technology.

The **M'zarch** *race took a less subtle approach. Assembling a three-ship task force, they headed for Astra. Arriving just in time to chase away the Rooshrike Beaeki nul Dies na—who had been coming to discuss the cable with Meredith—the M'zarchs landed troops and called for the humans' surrender. Their attack was repulsed with the help of a Rooshrike force summoned by Beaeki, a force which then proceeded to take up defensive positions around Astra.*

The other races lost no time in reacting to the M'zarch attempt. In quick succession the **Whissst**, *the* **Orspham**, *the Ctencri, and the* **Poms** *each sent warships or trading vessels to Astra with offers of both defense and merchandise credit. And on Earth, Saleh ordered an international team to the colony to take charge of the Spinneret studies.*

On Astra, however, an increasingly protective attitude was growing toward the Spinneret, culminating in a Council resolution to bar all non-Astrans from examination of the Spinneret cable. Meredith had no intention of accepting that recommendation; but when the UN-sponsored team arrived, he used the resolution as an excuse to deny them access. In doing so he made an enemy of **Ashur Msuya**, *the anti-West UN official Saleh had chosen to lead the delegation.*

But Msuya's threats of economic sanctions were something to be taken seriously, and Meredith began negotiations with the Rooshrike to establish a secure supply line, offering lengths of Spinneret cable as payment. Perez, thinking along similar lines, began wondering how many new citizens Astra could absorb as cable money began to come in—and what sort of employment he could offer newcomers with Astra's restricted job opportunities.

And then Hafner, searching in some hills several kilometers south of Mt. Olympus, found a buried door, almost certainly the long sought-after way into the Spinneret machinery. With only a little effort, the door was opened to reveal a long tunnel. Meredith, **Major Craig Barner**, *Perez, Hafner, and Hafner's assistant* **Al Nichols** *took a car and, leaving a force of soldiers to guard the entrance, headed inside.*

The tunnel was several kilometers long, and after finding various cross corridors, store rooms, and a working—though disabled—automated digging machine, they came to a huge underground cavern that simulated the view of a sky from a normal planetary surface. Exploring the obviously long deserted village nestled beneath the artificial sky and sun, the group surprised a device resembling a large snake-topped turtle shell on spider legs. Fleeing from the device—which Perez dubbed a **Gorgon's Head**—*they passed through a wall that divided the cavern in half and entered a tower there. The top of the tower contained an obvious control room . . . and two more Gorgon's*

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Heads. Instead of being attacked, though, each of the five men was given a sort of sniff test by the devices, a test that apparently coded them as authorities in the central Gorgon's Head files. Over the next few days it became apparent that the courtesy was far from token: certain areas of the Spinner cavern, including the control tower, were off-limits to anyone not accompanied by one of the five, enforcement provided in the form of choke-holds by the large number of Gorgon's Heads now wandering and standing guard around the cavern and tunnels.

It was quickly clear that the earlier Council ban on outside examination of the Spinneret would have to be modified; but even as Meredith prepared to suggest an American scientific group be invited, Perez took unilateral action to ensure a more international participation. Writing up invitations, he passed them to a Ctencri who had come for trade and security talks.

With all the time on his hands that "supervisor" escort duty allowed, Hafner began wondering about the Spinners' motives for building the Spinneret and what exactly they'd wanted with millions of kilometers of unbreakable cable. The possible military uses bothered him most, as it did Carmen and Meredith, both of whom were deep in the details of trade agreements. In the midst of it all Msuya returned from Earth . . . bringing with him President Allerton.

The midnight meeting was short but sharp. Msuya repeated his demands for UN access to the Spinneret equipment, and when Meredith again refused, Allerton—clearly under pressure—ordered Meredith relieved of command. But Perez, Carmen, and Hafner, whom Meredith had brought as advisors to the meeting, came to his support, refusing in the name of the Council to accept the replacement Msuya had brought to Astra. With threats of UN sanctions and courts martial, Meredith took a step neither man had apparently anticipated and declared Astra an independent and sovereign nation.

In anticipation of Earth's retaliation, Meredith set up defense agreements with the alien ships still overhead and also ordered hydroponics equipment from the Poms and Rooshrike, paying for the purchases with the first commercially-produced Spinneret cables.

Meanwhile, back on Earth, the Ctencri Perez had asked to contact his list of scientists turned the invitations over to the UN. **Dr. Loretta Williams**, *linguistics specialist, received a visit from U.S. and UN officials, who delivered her copy of Perez's invitation and asked her to accept . . . and to be their spy. Reluctantly, she agreed, though with uneasy feelings about the "protective custody" her two children would be going into while she was on Astra.*

While inspecting the Poms' newly delivered hydroponics ship, Carmen was offered an interesting information-for-cable deal, through which were obtained the first real hints of the science behind the Spinneret cable's strength and "glue." Returning to her shuttle, she was informed by Meredith's aide, Andrews, that the scientists Perez had invited were similarly about to land. The scientific cavalry, as he put it, had arrived.

* * *

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Chapter 25

Loretta would hardly have thought of herself as part of a cavalry, given both the number and loyalty of the group sitting together along one side of the conference table. A five-person guerrilla force, perhaps; a team dedicated to the ultimate overthrow of a depraved dictator and his gang of traitors. It was a noble and—she had to admit—rather romantic image, one which had been so strongly emphasized during both their training and the voyage to Astra that she'd rather come to believe it.

Except that Colonel Meredith didn't strike her as the depraved dictator type.

It wasn't simply a matter of appearances, either. Loretta had ranged over sizable portions of the world in her field work days, and she'd developed a knack for judging people by speech patterns and appropriate body language. Standing at the end of the table, describing the Spinneret cavern and the somewhat Spartan life which was all that Astra currently had to offer, he seemed much more like an earnest if misguided department head than a power- or profit-hungry despot. Maybe, though, he was simply an excellent actor. She hoped that was it; and unless and until events proved otherwise it would be the only safe assumption to make.

The meeting took about an hour, and afterwards they were taken by flyer to an army camp sort of place next to the lake Meredith had called the Dead Sea. Only a handful of permanent structures were yet in evidence, but each of the five scientists was assigned to one of them. From the outside they looked rather repulsive, enough so that the homey interior Loretta walked into was a pleasant surprise. Her luggage was stacked neatly by her bed—*probably searched during the meeting*, she decided—and after a quick tour through the house's four rooms she began to unpack.

She was interrupted halfway through the second suitcase by a quiet knock at the door. Opening it, she found a pleasant-looking young man in civilian clothing. "Yes?" she asked.

"Dr. Williams? I'm Al Nichols, one of the people who'll be working with you here. I trust I'm not butting into anything important—like sleep?"

"Oh, no," she assured him. "Please come in, Dr. Nichols."

"Al," he corrected, stepping past her and glancing around the room. "Not bad—I didn't know they'd gotten these places fixed up this nicely. I just dropped by to meet you and welcome you on behalf of Astra's scientific community. I trust you had a good trip?"

"It was all right—not much to do, though. Uh—can I get you something to drink? Though I'm not sure yet what exactly I've got."

He grinned. "No, thanks. And your selection's not going to overwhelm you by its diversity, I'm afraid. For the moment, anyway, we've got lots of money and nothing very interesting to spend it on. Sort of like being a millionaire in Idaho."

She smiled, some of his cheerfulness penetrating her mental shield. "Why don't we sit down, then, and you can tell me all about the Spinneret."

"By and large, it's a great alien machine that generates indestructible cables and nervous ulcers," he said, sitting down at one end of the couch as

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Loretta took the chair opposite. "The *Scientific Directory* lists you as one of the best paleographers around, but I think you're going to have the challenge of your life in there." Her jerked his thumb toward the picture window, where the tunnel doors Meredith had mentioned were just visible beyond the rows of tents.

"I'm looking forward to it," she said. "Are you a linguist, too?"

He snorted. "Hardly. By training I'm a geologist, but since I was stuck with Spinneret duty anyway it was either change specialties or go nuts with boredom. Luckily, I didn't have to start the whole field from scratch—we've got a very nice translation computer system the Rooshrike bought from the Ctencri for us. I've been busy transcribing the Spinner control and indicator labels into it, but so far we haven't got anything but hints as to what any of it means."

"I see," she nodded, wondering why he'd been stuck with the job. No one else with any more experience? "Well, I have some practice in figuring out unknown languages. Together we ought to be able to crack it."

"I hope so." Nichols glanced at his watch. "Oops—duty calls. I've got to go escort the next shift into the tower." He got to his feet. "Maybe when you're settled in you could give me a call and I could show you what I've been doing," he suggested as Loretta walked him to the door. "My number'll be in your directory, and if I'm in the cavern someone'll take a message."

"I'll do that," she promised. "Thanks for dropping by."

"Sure. See you later."

She closed the door behind him and went back to the living room, where she watched for a moment as he jogged toward the tunnel. Then, with a sigh, she turned back to the bedroom and her unpacking. For a few moments things had been normal again; she'd just been one normal scientist conferring with another on a project of mutual interest. But that warm, comfortable feeling was fading quickly now. *This whole thing would be a lot easier,* she thought bleakly, *if the people at least felt a little phony. Maybe the facade will crack after we've been here for a few days. I sure hope so.*

But, somehow, she didn't think it would.

"One more good squirt should do it," the young chemist said, his voice muffled by both his filter mask and the natural damping within the cramped tunnel. Perez nodded silently, wishing he hadn't volunteered for this job and simultaneously glad he didn't have to be the one to drip hydrofluoric acid onto the stone blocking the Spinner digging machine's tread. From the shuffling of feet behind him, he gathered he wasn't the only one glad of it.

It had been a dead-dull day all around. Meredith had decided he wanted the diggers looked at, and the four-man group had accordingly been sent out on a grand tour of the Spinneret's outer tunnel network. They'd spent six hours and located eight machines . . . and in the end only this one—the one Meredith had found on that very first trip—had a hope in hell of being restored without a complete maintenance manual. Perez's part had consisted mainly of standing around watching for the Gorgon's Heads

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that were ranging more and more widely as human activity in the cavern increased. No one knew whether the digging machines were on the Gorgon's Heads' restricted list or not, but it wasn't a smart chance to take. Their single experience with Gorgon's Head enforcement to date indicated the machines were programmed simply to hold potential intruders for questioning; what was still needed was a way to explain the sensitivity of the human neck to them.

"She's moving!" the chemist barked, scrambling a hasty couple of steps backwards. "Come *on* . . . there!"

And with a loud *crack,* the remains of the offending stone were kicked free. A low hum was almost instantly drowned out by a raucous grinding noise as the machine hit the tunnel face and began boring into it. "Just like it'd never quit," the chemist shouted over the noise. "Figured we'd at least have to find a reset switch."

"Probably been monitoring itself, waiting for someone to take the stone out," Perez shouted back. The digger was a good couple of centimeters into the rock now, and though Perez couldn't see where the fragments were going it was clear they weren't simply being scattered around. "Let's get back to the cavern."

They made their way back to their car, parked outside the digger's tunnel, and headed inward toward the main entrance gallery. There was little conversation—everyone seemed equally tired—and Perez took advantage of the quiet just to sit and think. The scientists he'd invited to Astra could be here any time now, and he still had to figure out what he was going to tell Meredith when they suddenly showed up.

An operations center had been set up just inside the Spinner cavern, a sort of open-air office that clashed badly with the alien scenery beyond it. Perez turned in their car, was told Meredith wanted him in the tower, and checked the vehicle back out again with a sigh. Driving to the nearest gap in the Great Wall, as it was now generally called, he headed across the open area around the tower on foot. The twenty-minute round trip was an annoying waste of time, but none of the wall's gaps was big enough for a car to fit through. Carmen had ordered some golf cart-style vehicles from the Ctencri, but they'd been hung up by the need for major modifications, and until they arrived there was nothing to do but put up with the forced exercise.

Meredith, as he expected, was in the tower's main control room, along with Major Barner, whose shift it was. What he *hadn't* anticipated was that the two of them would have guests . . . or who those guests would be.

"Ah, Perez," Meredith nodded. "I have a couple of people here I'd like you to meet. Dr. Bhartkumar Udani, Dr. Victor Ermakov; this is Councilor Cristobal Perez. Doubtless you'll recognize him as the gentleman who wrote you about coming here."

Seldom had Perez run into such a test of his poise, and he would later remember virtually nothing about the next few minutes except that no one seemed to notice anything odd about his behavior. By the time his brain began working again Meredith had turned the scientists over to Barner and the three of them had left the room.

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"Well?" Meredith asked when they were alone. "Not even a simple 'golly, Colonel, what a surprise'?"

Perez cleared his throat: it seemed to help. "I was expecting you to call me while all of them were still in orbit," he said.

"To find out what they were doing here?" Meredith shrugged. "We figured that out a long time ago. You were observed giving that package to the Ctencri, you know."

Perez swallowed. "Oh. I, uh, wasn't expecting you to take it so calmly."

Meredith's expression didn't change . . . but suddenly there was a look in his eyes that made Perez shiver. "Don't mistake control for calm, Perez," the colonel said coldly. "You didn't like the way I was running Astra, so you forced a new set of rules down my throat—and now you've shown you can't even live by *them*. By all rights you should be under house arrest right now, or at the very least Astra's first ex-councilor."

"So why aren't I? Because it worked?"

"You think it worked, do you? How many scientists did you send letters to?"

"About a hundred fifty. I wasn't sure all would be able—"

"Only five came."

Perez stared at him. "*Five?* That's *all?*"

"Five. Francisco Arias of Brazil, Slobodan Curcic from Yugoslavia, Loretta Williams from the U.S., and the two you just met. I hope you didn't offer anything like a blank check to the Ctencri for this."

Perez shook his head. "The agreement was for an unspecified amount of cable. Carmen can take the low turnout into account when she hammers out the details." He cocked an eyebrow. "So again: why aren't I being punished?"

"Because I'd rather make you pay your debts in sweat than in blood," Meredith said. "Algae ship or not, we're likely to be facing some lean times; I'm going to hold *you* personally responsible for the behavior of the Hispanics here. I've heard grumblings about profit-sharing or lack of it, and it's going to be your job to make it clear that all 'profits' from the Spinneret are currently going directly into their stomachs."

"You don't have to spell it out, Colonel," Perez told him stiffly. "As long as everyone is treated fairly there won't be any trouble. Credit me—*and* the other Hispanics—with that much sense."

"All right. Then tell me how the digger search went. Any of them in working condition?"

"Just the one with a stone in its tread," Perez said, relieved by the change of topic. "We got it out, and last we saw it was tunneling cheerfully into the rock. I left word at the op cent for a round-the-clock watch on it."

"Good. We'll want to see where it goes when it's full." He frowned. "You have any estimate of the horsepower of the thing?"

Perez shrugged. "Not really. Between fifty and a hundred, I'd guess. Why?"

"Because the ability to idle or whatever for a hundred millennia *and* also put out that kind of power means that the digger's either got one hell of a battery pack or else is running off some kind of broadcast power. Either way,

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it's just one more goody to tempt potential invaders."

Perez shook his head. "You worry far too much about that, Colonel, in my opinion. After the M'zarch fiasco no one's going to be brash enough to launch an invasion. *Especially* when they don't know exactly what we've got down here that might serve as weapons."

"Maybe," Meredith sighed. "But maybe not. The longer they hesitate, the more entrenched we become. And I'm sure they realize that."

"Let 'em realize it," Perez said, stepping toward the elevator. "In my humble and untrained opinion it's already too late for a successful invasion. Well. If that's all you wanted, my duty's up for the day and I'm going home. You coming?"

"Not yet," Meredith said, his eyes drifting to the windows and the Spinner village below. "I think I'll stick around and see if anything happens when the digger goes to dump its load."

Secretary-General Saleh—leader of the UN, chief trade representative to alien races, and arguably the most powerful man on Earth—laid down the last sheet of paper with the bitter taste of helplessness on his tongue. "What you're asking is essentially a carte blanche for whatever you want to do on Astra," he said wearily. "You know I can't give you that."

"Why not?" Ashur Msuya asked. "The people want action—or haven't you been watching the newscasts lately?"

Saleh snorted. "Surely you don't expect me to take all those carefully staged demonstrations seriously?"

"The rest of the world does. And as for my proposal, it's clearly spelled out that you have the final word on anything I do."

"Oh, of course—except that the eight-day round trip renders that effectively meaningless."

"Only if you're looking for true veto power," Msuya said quietly. "*And* true responsibility."

For a long moment Saleh stared into Msuya's unblinking eyes, knowing deep within him there was no way the man would be stopped. Saleh had originally chosen him to lead the mission to Astra because of his intensely pro-Third World stance, a bias Saleh had hoped would act as a bulwark against the West's usual ability to get more than its fair share of things. But the plan had backfired. Whatever motivations of justice Msuya may have once had were submerged now beneath his utter hatred for Colonel Meredith. With or without Saleh's permission he would find a way to destroy the colonel . . . and if Saleh stood in his way he might well precipitate a power struggle within the Secretariat itself, a battle that could cost Saleh his position and simultaneously wreck any chance the world might have for international peace and unity.

But if Saleh officially backed his proposal, the Secretary-General was covered. A success in reclaiming Astra would reflect favorably on him; a failure would be Msuya's responsibility alone. The inherent communications time lag would give Msuya effective autonomy. If he chose to act on something their new Astran spies reported, there would be no chance for Saleh to exercise his supposed veto power.

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And Msuya knew it. He was offering his political future against a chance for vengeance.

Dropping his gaze to the papers before him, Saleh sighed. "All right," he said, picking up a pen. "You'll take the *Trygve Lie* and go to Astra, sending the *Hammarskjöld* home when you get there. You *will* keep within the boundaries set in this paper, observing and collecting information *only*. No action of *any* kind without my written permission first."

"I understand," Msuya nodded.

Sure you do. The meaningless words still tingling on his tongue, Saleh signed the page and tossed the batch of them across the desk. "Have my secretary give you a copy," he growled. "I'll arrange for the *Hammarskjöld* to rendezvous with you periodically to deliver supplies and bring back any information you gather. In an emergency the Ctenori could probably be persuaded to deliver a message."

Msuya smiled tightly as he stood up. "Don't worry. I'm sure there will be no emergencies." Turning, he left the room.

My new frontier, Saleh thought dully, staring at the closed door. *My quixotic hope for the restless and hopeless; the world I personally helped begin . . . and now I must simply sit by and watch while you live or die.* For the first time in his life, he began to understand the permanent melancholy in his grandmother's face that had always bothered and frightened him as a child.

His grandmother had been a midwife in a small Southern Yemeni village . . . a village with a fifteen percent infant mortality rate.

Chapter 26

Suddenly, it seemed, it was autumn.

Not like autumn in Pennsylvania, of course, Hafner thought as he climbed up one of the hillocks bordering the Dead Sea; not even like autumn in southern California. Here there were no maples or oaks to scatter colored leaves around like God's own currency thrown freely to rich and poor alike. On Astra the only signs of fall were a drop in air temperature and a gradual reduction in the number of daylight hours. Turning, Hafner squinted at the cone of Mt. Olympus in the near distance. *Odd,* he thought. *I can't even force myself to see it as a natural formation anymore. I wonder why I couldn't see it as anything else before?*

Carmen's voice drifting up from below interrupted his idle reverie. "Aren't you supposed to plant a flag or something when you get to the summit?"

Turning back, he grinned down at her. "You come up with an Astran flag I can live with and I'd be pleased to plant it," he called. "Most of the designs I've seen so far would be more suitable for burial."

"You're an aesthetic snob," she laughed. "Come on down; lunch is ready."

He scrambled back down the gentle slope and joined her on the spread-out blanket. "At least we won't have any problem with ants," Carmen commented, handing him a sandwich. "Eat hearty; it's the first batch of processed algae from the Flying Hothouse."

Cautiously, Hafner took a bite. It was pretty good, actually, though not quite up to normal California standards. The

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texture was about right, and it took no real effort to believe he was eating actual ham. "Not bad," he said, the words coming out mushy around the food. "Especially with, what, only a week of work?"

"Closer to two—you've been spending too much time underground lately. Of course, the processing'll go much faster now that all the bugs are out of the system."

"Yeah." Hafner took another bite. "Speaking of being underground, you haven't told me yet what you thought of the Spinner cavern."

She shook her head. "I wish I had the words to do it properly. It's the most fantastic thing I've ever seen. Does that artificial sun actually track across the sky?"

"Sure does," he nodded. "Gives us a cycle of twenty hours of daylight to ten of night, presumably matching that of the Spinners' home world. And the sun isn't a hologram, or at least they don't think so—the light intensity is too great and matches a G3 star spectrum too closely. No one knows yet what it is or how they get it to move. Ditto for the clouds and stars, by the way."

She shook her head again. "I see now why you and Cris and the colonel were so dead-set on keeping the place out of the wrong hands—human or otherwise. I've been thinking—well, never mind."

"You've been thinking we were all going megalomaniac?" he prompted.

"Well . . . maybe a little. But I think I understand now."

"Good. Maybe it'll help you in your trade negotiations. How are they going, by the way?"

"Oh, business is booming. I've got six contracts in the stack, just waiting on the raw metal deliveries. I calculate that in a couple of years we'll have a shot at passing the U.S.'s GNP."

"And with a fraction of its population. The old oil barons will turn over in their graves."

Carmen was silent for a moment. "Maybe we should start figuring out how we're going to share all that wealth."

He frowned at her, trying to place that tone of voice. "You've been talking to Perez, haven't you?" he asked. "All that stuff about the *New Mayflower*."

"The who?"

"Oh, he hasn't sprung that one on you yet? He wants us to buy the *Aurora* or *Pathfinder* and outfit it for shuttling immigrants here from Earth."

She sighed. "That sounds like him: great with people but no head at all for economics. We could probably rent M'zarch troop carriers a lot cheaper than buying one of our own."

Hafner made a face. "Well, I hope *one* of you experts is thinking about where we'd put this flood of fo—flood of people," he corrected himself hastily.

"We recognize the problems," Carmen said, giving him an odd look. "We're not going to rush into anything half-cocked. What kind of flood were you going to call it?"

Silently, Hafner cursed his tongue. "A flood of foreigners," he admitted reluctantly. "Perez wants to recruit people mostly from the poor Third World nations."

"And?" Carmen prompted, her voice studiously neutral.

"Well, face it—if that happens we original Astrans are going to wind up

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as a pretty small minority here. Those of us who came here because we wanted to are going to be flooded out by people looking for the ticket window to the galaxy's gravy train."

"Yeah. Maybe." For a moment Carmen gazed out at the waters of the Dead Sea, her forehead furrowed in thought. "I don't know what to say," she sighed at last. "It *will* change Astra—there's no doubt about that. We're four small villages that are going to become huge cities, and those of us who've sweated through the rough times are likely to get lost in the crowd. But we can't simply live here alone like—well, like the oil barons you mentioned. After all, it's not like this is profit from something we've done ourselves."

"Why do we have to bring all of them *here*, though?" Hafner grumbled. "Why not just give the money to them right where they are or something? Hey—that may be it."

"May be what?" Carmen asked, eying him suspiciously.

"The answer to our dilemma." The thoughts were coming thick and fast now, and Hafner fumbled a bit as he tried to keep up with them. "It'll be like foreign aid—better yet, like a new Marshall Plan. We can funnel a portion of our profit to the poorer countries, probably in the form of credit with the Ctencri, maybe tie the amount to inverse GNP per capita so that it goes to the countries who need it most—"

"And how do you guarantee it goes to the *people* who need it most?"

"—with a clause to prevent—um? Oh." The grand scheme seemed to explode into soap suds in front of him. "Yeah. Well . . . we could write something into the agreements, I suppose."

Carmen smiled sadly. "Half the countries that need that sort of aid already reject help that has any strings attached. Besides, the contract hasn't been written yet that someone couldn't find a loophole in."

Hafner pursed his lips tightly. She had indeed been talking to Perez, he decided; talking *and* listening. "It'd still be better than trying to bring the starving millions here," he growled. "Most of them don't have any skill except farming, and they sure as potholes aren't going to continue that line of work here."

"I know," Carmen sighed. "And I don't know how we're going to get around that. All we can do is keep working on it."

"Yeah." Hafner looked down at the half sandwich still clutched in his hand. "So much for our nice, quiet lunch away from the universe," he said, shaking his head. "Look, why don't we sort of back out and come in again, okay? Let's just enjoy our algae and the lovely gray-brown scenery and forget about politics for a while."

"Sure. I'm sorry I brought up the subject." Carmen smiled wanly and took a bite of her own sandwich. "So . . . what sort of gossip do you hear lately?"

They talked about people, the rate of progress of the Earth scientists, and other relatively innocuous subjects for the next hour; and when Hafner escorted Carmen back to the Spinneret camp and her waiting vehicle, she professed herself satisfied with the break from the pressures of her work.

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He pretended to believe her . . . but as she drove off toward Unie he felt his own cheerful expression sag into a grimace. *Just too dedicated to her job,* he thought, shaking his head as he trudged toward his crackerbox apartment to await his early-evening shift. *Probably won't be able to really relax until this whole immigrant thing is resolved. Perez will see to that, I'm sure.* The thought of the Hispanic infecting her with his own excessively liberal philosophy was more than a little annoying, but there wasn't a lot he could do about it.

Except perhaps to offer an alternative to his grand immigration scheme. So far, Hafner'd heard nothing that corresponded to his own Marshall Plan idea being tossed around during mealtime discussions; and if it truly *hadn't* occurred to anyone, he really ought to point it out to Colonel Meredith. Despite Carmen's skepticism, it seemed to him the plan had potential merit.

Changing his direction, Hafner headed toward the tunnel entrance. Meredith, he knew, was currently in the tower . . . and Hafner suspected he'd welcome someone to talk to.

The same three-squiggle pattern showed up over eighty times in the main control room alone . . . and the pattern of lights and switches associated with it was more than a little suggestive. *All right,* Loretta thought, tapping at the fist-sized walkabout terminal of the Ctencri translator humming quietly off to one side. *Call this "on" or "active" or "functioning." Correlate. . . ?*

She pushed the proper button and watched the translator screen list eight more combinations involving the three-letter pattern and their possible meanings. *Activate, standby—off? Ah—then that tilde would indicate inversion of meaning. Let's see where else the tilde shows up.* . . . Punching in the order, she was rewarded a moment later with an overhead schematic of the semicircular control panel, the tilded labels flashing in red. Referring occasionally to the picture, she walked slowly around the room, looking closely at each of the switches and indicators so identified. The next step would be to choose one or two of them and play through the data file of the last cable production again, watching for anything that might give a clue as to their function. Loretta hadn't done too well so far with that particular method; all the obvious correlations had long since been tabulated, and she lacked the engineers' knack of pulling seemingly unrelated sounds and activities into a coherent whole.

From underneath the control panel came a dribble of muttered Russian. A moment later, Victor Ermakov crawled stiffly out and unfolded into a standing position. "It is thoroughly ridiculous," he grumbled, waving a multimeter for emphasis. "Half the circuits are inert, with no current flow and infinite resistance—and the other half show an absolutely *steady* current, with no discernible modulation. How do you control something with unchanging current?" He turned to Meredith, sitting quietly next to one of the Gorgon's Heads. "Colonel, the digger *is* still at work, isn't it?"

"It was as of five minutes ago," the other said. "That's when it dumped its last load into the hopper." He pointed to the blue section of the control panel

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beneath which Ermakov had been working. "I saw the pattern change."

The Russian scowled at the board. "I'm beginning to think Arias is right, that the Spinners aren't using conventional electronics here at all."

Loretta shrugged. Francisco Arias had tried to explain his theory to her, but his mastery of the more arcane branches of physics didn't include the ability to translate them into layman's terms. All she'd taken away from the session had been a headache and the fact that too much of the Spinneret equipment was superconducting cable material for it to function along normal electronic lines. He'd then launched into something about subatomic forces and field waveguides that had lost her completely. "He *did* seem very sure of himself," she commented.

"He always does." Ermakov shook his head and turned again to Meredith. "Colonel, it's becoming clear that I'm literally going to have to invent the tools I need to study this equipment. Have you any data at all on the subatomic structure of the cable material, or on any general nuclear theory about the forces that may be involved?"

A thoughtful frown creased Meredith's forehead. "Possibly," he said slowly. "But I'm not sure what kind of access I can let you have to it."

For a scientist, Ermakov was an uncommonly good spy; Loretta had to give him that. His ears seemed to prick up at the mention of classified information, but his next comment was as casual and ingenuous as could be. "Well, it's your decision, of course," he said, shrugging. "But the more insight I can get into the Spinners' science, the faster I'll be able to understand their engineering."

"I'm aware of that." From the ceiling came the hum of the elevator motor. Loretta glanced at her watch, noted that it was still an hour before the next supervisor was due to relieve Meredith. She looked back up to see the colonel get to his feet and walk around the elevator cylinder to where the door would appear. Unconsciously, her muscles tensed . . . but it was only the geologist/supervisor, Dr. Hafner.

"Colonel," Hafner greeted the other, nodding in turn to Loretta and Ermakov. "I wonder if I could talk to you for a moment? It's about a possible alternative to mass immigration."

Meredith shrugged. "Sure."

Hafner launched into a description of something he was calling the new Marshall Plan; tuning him out, Loretta turned back to the control board. *All right: tilde means negation. Then on the digger board this might mean "empty hopper"; then—let's see: does this sequence show up anywhere else—?*

"I trust you're doing better than I am," Ermakov murmured from beside her. He had his multimeter on the edge of the control panel and was busily switching around the probe leads. "Incidentally, I wonder if I could borrow your tape player and some of your tapes this evening."

Loretta's throat tightened, and she had to consciously force the muscles to relax. The tape player was her clandestine radio link to the UN ship overhead, the necessary electronics for transmission and scrambling concealed inside the plastic covers of two of the cassettes. "I suppose so," she said, trying to

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match his casual tone and wondering what had happened to his own radio.

"Thank you. I've been talking about music lately with Major Dunlop and he expressed a wish to listen to some Tchaikovsky and Rachmaninoff. I'll come by your apartment when we're through here and pick it up for delivery to him."

"Fine," she said through stiff lips. Dunlop. The officer the UN people said had fired stunners at a group of workers in Ceres and been severely reprimanded by Meredith for his actions. A man she remembered being described as a vain, hard-nosed type who preferred gunboat to all other forms of diplomacy.

And Ermakov was about to lend him her radio.

The Russian completed his adjustments and disappeared again beneath the control panel. Loretta moved away, staring at the gaudy Spinner colors without really seeing them. She hadn't even realized Ermakov and Dunlop had been talking together, let alone planning . . . what? What could the two of them have cooked up that Dunlop needed to talk to the UN ship about? The scientists' mission here was supposed to be the strictly passive acquisition of Spinneret data . . . unless Ermakov had special instructions she was unaware of. A sudden dread hit her between the shoulder blades and she glanced behind her, half expecting to see that Meredith had put such an obvious two and two together and was summoning soldiers to arrest her for espionage.

But the colonel was still talking with Hafner, apparently oblivious to both Ermakov's scheming and her own associated guilt. Weak-kneed with relief, she turned back and resumed punching in computer commands with shaky fingers.

Ermakov didn't bring up the subject again, and as they were leaving the cavern four hours later she permitted herself to hope that he'd either forgotten his request or changed his plans. But as she walked past the tunnel guards and out into the early-evening gloom he quietly fell into step with her; and a few minutes later he left her apartment with the player tucked under his arm.

Loretta watched him go, then closed and locked her door behind him. She considered dinner, decided she'd lost her appetite, and lay down on the couch with a book instead. But her mind refused to concentrate, and eventually she gave up and went to bed. Two or three hours later, she managed to fall asleep.

And five hours after that, a group of soldiers led by Major Dunlop overpowered the guards at the tunnel entrance and took control of the Spinner cavern.

Chapter 27

". . . call on all loyal citizens of the United States of America to join us in reversing this clear and heinous act of treason that Colonel Meredith has commited." Dunlop's voice came through the phone speaker, its imperious tone masked somewhat by the dull roar of vehicles behind it. "Those who do not will share the massive guilt and the punishment—"

"Enough," Meredith barked, slipping on his jacket and sitting down on his bed to fasten his boots.

At the other end of the connection Lieutenant Andrews shut off the re-

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cording, and Dunlop's harangue vanished in mid-adjective. "Went out over the whole PA system, you said?" Meredith growled.

"Plus the civilian phone net," Andrews said. "Apparently decided he already had all the soldiers that were on his side."

"I hope so—I like having all my enemies bunched together in one place. Any idea how many there are?"

"The guards on duty at the time were all stunned, but I saw at least one truck go in after the dead-man alarm went off, so there could be forty or more of them plus a fair supply of material. They're only about ten minutes ahead of us, though, and I've got a team ready to go after them as soon as the demolitions men can get the other truck out of the way."

'Tell them to go easy on that thing," Meredith snapped. "I doubt even a nuke could bother the tunnel, but if Dunlop wasn't lying about the size of the bomb in there it'll kill everyone in the area if it goes off."

"I know, sir." Andrews sounded simultaneously miserable and furious. "We're getting people clear as fast as we can, but—well, there are a lot of civilians among them."

Who move slowly and ask unnecessary questions and otherwise waste time, Meredith thought bitterly. "Well . . . don't let it get to you. There's not a lot Dunlop can do in there except dig in and prepare for a siege. There isn't anyone at the op cent or in the tower, is there?"

"We don't think so, sir, but we don't know for sure. Again, the guards are unconscious, and they could have passed someone through—"

He was interrupted by the high-pitched squeal of the emergency breaker. "Colonel, this is Major Barner. Dr. Hafner's not in his quarters. No evidence of any struggle, but his phone is still here."

Meredith felt something icy trickle down his spine. "Check on Perez and Nichols immediately," he told Barner. If Dunlop had barricaded himself in there with three of the Spinneret's five supervisors—

But it wasn't quite that bad. "They've already reported in," Barner said. "Heard Dunlop's broadcast and called to find out what was going on. I told them both to stay put till I could get them escorts."

"Good." Not as bad as he'd feared, but bad enough. With Hafner as a hostage, Dunlop's options were no longer limited to digging in near the cavern entrance. The entire cavern, tower included, was open to him now. "Major, I want you to take charge of clearing out the area around the tunnel and then stay clear youself. Andrews, start a full ID check—I want to know exactly who Dunlop's got in there with him. Feed the list through to Carmen Olivero at the admin complex here—I'll let her know it's coming. Also, have the demolitions crew slow down. We're not going to catch Dunlop before he's had time to deploy his men anyway, and I don't want them cutting corners and blowing themselves into orbit."

"Yes, sir."

"Keep me informed; I'll be there in a while." Breaking the connection, Meredith snatched up his gunbelt and hurried outside. The eastern sky was

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showing a faint glow now; stopping momentarily, he punched Carmen's number onto his phone before continuing his jog toward his office.

She answered on the first ring. "I heard the announcement," she said after Meredith had identified himself. "I figured it'd be better to wait until you called instead of bothering you with questions."

"Good thinking. How fast can you get to your office?"

"Thirty seconds; I just came through the front door. You want me to alert the Whissst and Orspham?"

Silently, Meredith blessed her quick mind. "Yes, but don't tell them anything except that the UN ship is not to launch any shuttles or come in closer itself. I don't have any proof yet, but this stinks of collusion and I don't want Msuya's people available to reinforce Dunlop's play. Then run a check of our military personnel and see if anyone's had counter-terrorist or hostage-rescue training or experience."

"Hostage rescue?"

He grimaced. "Yes. We think they took Dr. Hafner in with them."

There was no startled gasp or exclamation . . . but when Carmen spoke again her words were packed in ice. "Understood, Colonel. How many commando teams will you want formed?"

"Two, possibly three. I'll be there before you get that far, though." He hesitated. "Don't worry; Hafner's worth an incredible amount to them alive and nothing at all dead. Even Dunlop wouldn't be stupid enough to hurt him."

"Yes, sir," she replied in that same cold voice. "I'll expect you soon, then."

Breaking the connection, Meredith increased his pace, swearing gently under his breath. *If you're behind this, Msuya,* he thought toward the sky, *you and the whole UN are going to pay a heavy price. Count on it.*

What Hafner didn't know about Ctencri stunners would have filled several volumes . . . but as he lay limply on the ground with his eyes closed he concluded his captors didn't know a whole lot more. Whether they'd misjudged the setting or merely grazed him with the beam he didn't know; but from his lack of restraints it seemed clear they thought he should still be unconscious. All around him he could hear footsteps and muttered commands and the clink of metal on metal as they rushed around building something. *Where* he was was no problem to figure out—only the Spinner cavern had that particular combination of odors and shifting winds. Probably near the op cent, he tentatively concluded, as occasional echoes from the entrance tunnel reached his ears.

It was the events occurring a bare meter away, though, that he found the most interesting.

It had started as a technical discussion regarding the boosting of power to some instrument in order to get past the effects of all the cable material in the area. But within a few minutes the problem was solved . . . and Hafner listened with growing astonishment as an unknown Astran voice and an all-too-familiar Earth one held a brief conversation.

"The Spinner cavern is now in our hands," the Astran said without pream-

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ble once the connection was made. "We have both the tunnel entrance and the cavern entrance booby-trapped and are setting up gun emplacements from which we'll be able to fire at anyone approaching us."

"Excellent." Msuya's voice was faint and tinny, but nonetheless recognizable. "The *Hammarskjöld* joined us twelve hours ago; together we have fifty UN troops we can land to reinforce you—"

"Negative," the Astran interrupted. "Your troops will stay right where they are."

"Come now, Major—you can't hold out forever there by yourselves."

"I know that. That's why the *Hammarskjöld*'s going to head back to Earth and bring me a contingent of American soldiers. I'll turn the cavern over to a properly authorized officer of the United States Army—no one else."

There was a short pause. "So you're unilaterally scrapping our agreement, are you?" Msuya said. To Hafner's ears he didn't sound all that surprised. "Suppose I refuse to send the *Hammarskjöld* back? What then?"

"Oh, you won't refuse," the major said confidently. "As matters stand now you have no leverage at all on Astra; with the planet under U.S. control you'll at least have a chance to get what you want here by putting on the pressure back home."

"I don't trust America farther than I can shift the Zambezi," Msuya told him. "Allerton is as good at weaseling as any other Western politician, and I have no interest in turning legitimate UN interests over to his charity. No, Major—right now we have our best chance to reestablish UN control of the Spinneret, and I'm going to take it. You can cooperate or else."

"Or else what?" the Astran shot back. "You going to sit back and let Meredith get back in when our supplies give out? Don't be silly. You'll do as I say and be satisfied with the crumbs the U.S. gives you."

"I see. I underestimated your ambitions," Msuya said coldly. "I assumed you'd be satisfied with the heartfelt thanks of the people of the world; but you apparently think you can become the Hero of Astra to the next generation of American schoolchildren."

"Your sarcasm is wasted, Msuya—your only miscalculation was in thinking Americans weren't patriotic anymore," the major said calmly. "You assumed I could be bought like some petty Third World dictator if you dangled enough empty promises in front of me. I trust you've learned differently now."

"I've learned you can't be trusted, but that's no great revelation. What now keeps me from offering aid to Meredith in taking the cavern back from you?"

"What for, the hope that our noble colonel will be grateful to you for abandoning your own coup?" the major snorted.

"It would be your word against mine," Msuya said. "From here I can destroy all traces of the transceiver you're using; you'd never be able to prove you'd been in contact with me. And as for Meredith's thanks, I think we could manage something more substantial once my troops were on the ground."

"I doubt it. You see, I brought a little insurance in here with me: Dr. Peter

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Hafner, one of the five people who has access to the main Spinneret machinery. Still think you're going to charge in here with blazing semi-auts?" He paused, but Msuya remained silent. "On the flip side, with Hafner as part of the bargain a peaceful takeover is now more important to you than ever—and the only way you're going to do that is with U.S. troops. So why not quit wasting time and get the *Hammarskjöld* burning up space back to Earth?"

"You seem to leave me without a reasonable choice," Msuya spat. "Very well, you'll get your American troops. But the matter will not end there."

"Maybe not—but it won't be you and me handling it, and I'd put President Allerton up against Saleh any day of the week. Good-bye, Msuya; let me know when my relief arrives."

There was a click and the scraping of a chair as the major got up and walked toward a sort of hammering sound in the near distance. His step seemed springy, and Hafner got the impression he was satisfied with the way the confrontation had gone. *Idiot*, Hafner thought. *Msuya'll just bring back UN troops in U.S. uniforms or something.*

But that wouldn't happen for at least a week. Meredith had until then to take the cavern back . . . and his chances would be greatly enhanced if the major's prize hostage could arrange to disappear.

Concentrating on keeping his breathing slow and steady, Hafner listened to the sounds around him and tried to come up with a plan.

"He appears to have fifty-two men in there with him," Carmen said, gesturing to the listing on the computer display they'd set up in the temporary command center half a kilometer from the tunnel entrance. "Thirty-five are from his Ceres contingent; none seems to have any special terrorist or siege training, so we won't have to worry about their anticipating anything clever our teams come up with. I've found you eight men with hostage experience, and at last count two hundred others had volunteered for the assault squads."

Meredith nodded with grim satisfaction. In the two hours since Dunlop's broadcast not a single Astran had publicly voiced support for the major's attempted coup. Even among those who were planning to leave with the next U.S. ship the mood was reportedly one of anger. Whether out of respect for him or contempt for Dunlop Meredith didn't know, but either way he was grateful for both their active and passive support. Having to split his attention between commando preparation and civilian crowd control would have badly diminished his ability to handle either. "Good. What news from the Whissst?"

"One of the two UN ships that were in orbit as of this morning left about half an hour ago, heading in the direction of Earth. The other hasn't made any moves at all, and there hasn't been any more activity on that super-high band since the Orspham picked up the one set of transmissions."

"Um." So whatever Dunlop and Msuya had had to say to each other, they'd apparently said it all and shut up. Meredith glanced out the tent flap at the double rank of armed guards facing the tunnel entrance, then looked back at the

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small group of people seated around the table. "Well. Suggestions? Major?"

Major Barner shrugged. "No way around it: a direct assault is all we've got. There's no way to pump in enough sleeper gas—even if we could get hold of it—to do any good, and the stunners don't have the range we'd need. We might be able to approach the cavern entrance from the side if the solenoid chamber or outer tunnels connect into the main passageway properly, but at that point we'll still just have to put our heads down and charge."

"What if they've booby-trapped the cavern entrance?" Perez spoke up from beside Carmen. "Your first line of men won't have a chance."

"I know," Barner grimaced. "But I don't see any other way."

"We have enough sets of body armor to outfit a five-man team," Andrews spoke up. "If necessary, we could send two or three men in first to deliberately trigger any traps and hope Dunlop went easy on the explosives."

"Dangerous, and possibly unnecessary." Perez turned to Meredith. "Colonel, I'd like to volunteer to go in and talk to Dunlop."

"And say what?" Barner snorted. "Appeal to his better judgment?"

"Hardly," Perez said coolly. "You forget my early experience with his better judgment. No, I thought I'd try pointing out the impossibility of any UN supplies or reinforcements getting through to him and the disadvantages of either starving to death or getting his head blown off."

"You won't change his mind," Barner shook his head.

"I don't expect to. But there would be other soldiers listening in; and some of *them* might reconsider their position." He shrugged. "You have to admit that fomenting discontent is something I do rather well."

"A good idea, but risky," Meredith said. "Unless you stay out of range and communicate by bullhorn he might be tempted to double his haul of hostages. But we may not have to go with the frontal assault, either. There's a chance we can sneak in the back door."

"Back door?" Barner asked. "You mean the volcano cones?"

"Exactly." Meredith indicated spots on the cavern diagram spread out before them. "We haven't gotten very far along either of the two tunnels that lead off from the tower side of the Great Wall. One of them has *got* to wind up somewhere under the volcano."

"But Peter tried to find an entrance through the volcano," Carmen objected.

"That was before he was an official Spinner supervisor," Meredith pointed out. "I think it'll be worth taking another look up there now." He nodded to Barner. "Major, you and Andrews get busy and organize those assault teams; if I find a way in we'll want to move quickly. Carmen, keep tabs on the UN ship and field any questions the aliens might throw at us. Perez, you'll stay here and assist Carmen."

"What about my idea of talking to them?" Perez asked. "As long as I stay back or with an armed escort—"

"If we find another entrance there won't be any need for sowing dissension," Barner told him gruffly. "Come on, Lieutenant."

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"I know. But you might be able to use a diversion."

Barner and Andrews paused halfway to the tent entrance, turning to look at Perez. Meredith didn't share their surprise; he'd seen where the Hispanic's line of thought was leading. From the look on Carmen's face she'd expected the offer, too . . . and didn't like it at all.

But this decision, at least, could be put off. "We'll discuss it *after* we've found a way in," he told Perez. "I'm heading to the cone; let me know immediately if there's any change in the situation."

The flyer that had ferried Meredith and Carmen in from Unie was parked a hundred meters away, out of any possible line of fire from the tunnel. Meredith jogged over to find Nichols and the four assistants he'd requested already aboard. Giving the pilot landing instructions, he spent the short flight conferring with Nichols on the methods he and Hafner had used on their previous attempts to find a way in. It was a brief talk, and didn't tell him very much.

The cone steepened fairly rapidly at the very summit, but the original searchers had left behind a piton-secured rope ladder/bridge over the rim, and within a few minutes the six men were assembled together at the edge of three hundred square meters of unmarked floor.

Meredith glanced around, noting the TV monitors still pointed down at them from the volcano rim. "Did you ever get the shots of the last cable operation clear enough to show where the floor opened up?" he asked Nichols.

"No," the other shook his head. "None of the enhancement techniques could do anything with them. We think whatever produces the zero-g fouled up either the camera or film. Or both."

"All right, then, I guess we do it the hard way." He pointed to his left. "I want you and two of the others to work that direction around the circle. Run your hands over the wall, poke at any crevices you find, and otherwise try to spark some kind of reaction. I'll go around the other way. Observers, you're to watch for anything Nichols or I might miss. Everyone understand? All right. Take it slow and careful and don't miss anything."

Slow it certainly was; slow and frustrating. Half a dozen times in the first twenty minutes Meredith found himself wondering if he was giving in to wishful thinking in his old age. Certainly nothing in the Spinner cavern had suggested that their "supervisor" status extended any further than the Gorgon's Head network, and whatever security system was hiding the entrance he was counting on finding was likely to be independent of the snake-topped machines. But giving up the search would lead directly to Barner's frontal assault, and he wasn't yet ready to concede the inevitability of that approach.

And then, with nearly two thirds of the wall covered, Nichols hit pay dirt.

"If you rest your hand right here for a second or two you get a faint scraping noise from behind the wall," the geologist told Meredith, indicating a section of wall pocked with tiny fissures. "We never noticed anything significant about these cracks before, but I wonder now if it could be an air intake of some kind."

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"With a Gorgon's Head on the other side?" Gingerly, Meredith placed his palm over the spot. Sure enough, the scratching was just barely audible. Gorgon's Head snakes against the wall?

"Wouldn't an air vent show a more regular pattern?" one of the others objected.

"You haven't seen the Spinners' love of squiggles," Meredith told him, testing various sections of wall immediately around the vent. "Seems pretty solid. Let's check around, see if the door is offset or something."

A search of the five meters to either side proved fruitless. "If there's a door here it looks like we're going to have to persuade it to open," Nichols said at last. "I've got some hydrofluoric acid; we could try it in the airvent."

"Go ahead, but I doubt it'll do any good," Meredith said, eyeing the wall thoughtfully. "So far we've never come upon a Gorgon's Head that couldn't get out of its cubbyhole when it wanted to. I suspect the door's not jammed but locked, and we're expected to know how to open it."

"I don't see anything that looks like the buttons of a digital lock," Nichols said slowly. "An ID card in one of the slots?"

"More likely a verbal command—you wouldn't want some worker to get trapped in the cone with no way out." An extremely foolish idea was beginning to take shape in the back of his mind. "On the other hand, you may also not want the average Spinner who has no business up here just wandering in and out like they can with the Dead Sea entrance."

"Well, then, what are we going to do? We're a long way to deciphering the written language, let alone the oral one."

"Let's try the acid and then maybe firing a few explosive shells around—just in case it *is* just stuck. After that . . . well, we'll talk about it then."

Neither the acid nor explosions seemed to make any difference to either the door or the hidden Gorgon's Head . . . and eventually Meredith was forced to climb out of the crater, make contact with Carmen in the command center, and lay out his plan.

She didn't like it. Neither, when consulted, did Nichols, Perez, Barner, or Andrews.

"Ridiculous," was Carmen's immediate response. "Ridiculous and suicidal and you're not going to do it."

"Out of the question," Barner seconded. "It's too long a shot to gamble your life over."

"I'll be in no danger," Meredith assured them.

"What do you mean, 'no danger'?" Barner retorted. "You *know* half the safety interlocks in this mechanized anthill are gone—look at what happened to the men in the solenoid tunnel."

"There weren't any Gorgon's Heads present then, and the men weren't supervisors," Meredith pointed out. "Besides, even if it doesn't work I ought to be safe enough against the wall. Safer than the first troops through the main entrance would be, anyway."

"If it's so safe," Perez spoke up suddenly, "then let *me* do it instead of you."

"No. It's *my* idea, and I'm going to do it. Period. Carmen, you'll make the proper arrangements immediately."

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"Yes, sir." Carmen's voice was sullen, but she clearly recognized an order when she heard one.

Or maybe she, too, recognized that they had no other choice.

They'd been inside for nearly a day when Hafner was abruptly shaken out of a deep sleep. "What's going on?" Major Dunlop's voice demanded.

Squinting in the light streaming through the open tent flap, Hafner tried to chase the cobwebs out of his brain. "Going—what do you mean—?"

"That rumbling—can't you hear it? What's Meredith up to?"

Frowning, Hafner listened for a moment. The sound, though, wasn't hard to place. "He's not up to anything. That's just the Spinneret starting into its production cycle."

His eyes had adjusted enough now to see Dunlop's face . . . and the expression on that face was one of tense suspicion. "What do you mean, production cycle? He's making a cable? *Now?*"

"Why not? Probably demonstrating to the aliens out there that Astra's still in business . . . that you aren't really in control of anything except a few square kilometers of underground real estate."

The last dig may have been a mistake. Dunlop's brow darkened and the fingers clenching his holstered pistol butt tightened noticeably. "Perhaps we should prove otherwise," he ground out. "What do you say we go out to the tower and start pushing buttons until it shuts off?"

Hafner felt his mouth go dry. "I say that if you mess up the settings or erase some program in the process Colonel Meredith will make a fortune selling tickets to your disemboweling," he said as casually as he could. "You'd probably have everyone from the Rooshrike to the M'zarch offering suggestions on technique, too."

Dunlop glowered at him for a moment, then turned on his heel and stalked away, letting the tent flap close behind him.

With a relieved sigh, Hafner checked his watch and settled back to try and catch another hour of sleep. *I wonder,* he thought as the darkness closed in, *just what the colonel is up to.*

Chapter 28

The last glint of sunlight had vanished from the inner lip of the volcano cone when the gravimeter fastened to the edge of Meredith's helmet began to change. "It's started,' he announced quietly into his microphone. "Two percent down and picking up steam."

"Your restraints set?" Barner asked, his voice barely discernible over the static that was beginning to fill the radio bands.

"Yes," Meredith told him, trying to sound more confident than he felt. The lines and bracing bars fastening him to the inner cone wall near the air vent weren't nearly as secure as he'd hoped to make them—unlike the Spinneret cable itself, which stuck to other things with a vengeance, the flat panels with which the volcano cone and cavern structures had been built were a very inert substance. Depending on the gradient of the zero-g field, it was conceivable Meredith would wind up being shot into space along with the latest batch of cable.

With a conscious effort, he put the

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thought out of his mind and reached out to press his bare hand against the air vent again. The gentle breeze that was starting to spring up kept him from hearing any scratching, but he was sure the Gorgon's Head behind the wall had detected and identified him. What it would do with that knowledge, though, was still an unknown.

The gravity was dropping rapidly now, and the local atmospheric pressure was beginning to follow. Cool air hissed behind Meredith's head, filling the pressure suit that covered all of the colonel except his hands. The general medical consensus was that such a limited exposure to vacuum would be safe enough for a reasonable length of time, but no one on Astra really knew what the limits actually were. Keeping one eye on the air vent and the other on his gravimeter, Meredith gritted his teeth and waited.

Brought up on a diet of American cliff-hanger drama, he was rather expecting the Gorgon's Head to wait until the last second before taking action . . . and it was therefore almost anticlimatic when, with the gravity only down to point four-g, a section of wall suddenly slid back and down, exposing the short-tunnel-and-elevator-shaft arrangement that had also been used in the cavern control tower. Meredith hit his harness release with one hand, reaching out with the other to try and get a grip on the edge of the opening. He needn't have bothered; from an alcove just off the tunnel a tentacle snaked out to wrap itself around his neck, and before he could do more than get his hands up to grip the metal hose he'd been pulled inside the tunnel and released. Massaging his throat, he watched the door slide shut again and, giving silent thanks to the Gorgon's Heads' programmer, set to work locating the inside controls.

Half an hour later the static cleared and he was able to reassure the anxious listeners that the gamble had worked. Twenty minutes after that Andrews and the ten-man commando team had joined him. Together they crowded into the elevator and started down.

It was a long trip. Meredith hadn't until that moment had a real feeling for how far below Astra's surface the Spinner cavern was—the gentle slope of the entrance tunnel had effectively masked that fact—and he was beginning to get fidgety by the time the elevator finally stopped. Moving quietly, the men fanned out, weapons at the ready.

They were, as Meredith had anticipated, in an unexplored area of the cavern complex. The room they'd entered was as large as the storerooms leading off the main entrance tunnel, but without the curlicue floor designs and with a much higher ceiling. At either end of the room were huge doors; and linking them—

"Railroad tracks," Andrews muttered, poking carefully at one with the muzzle of his Stoner 5.56. "Heavy-duty, from the look of them."

Meredith looked back and forth between the two doors. One led directly under the volcano cone, he estimated. The other was flanked by two very familiar-looking bulges. . . . "Let's backtrack it," he said, starting toward that door.

The Gorgon's Heads emerged from their alcoves before the group was within fifteen meters, walking on their

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spider legs to stand in front of the door release. "It's all right," Meredith told them soothingly, speaking—he realized belatedly—as if they were a pair of pet Dobermans. Stepping forward, he ran a hand over the top of each, then reached between them to poke the release. The doors slid open—and Meredith found himself facing what could only be a space ship.

A *big* ship, too; nothing like the *Aurora* or *Pathfinder*, of course, but certainly comparable to the UN's Cteneri-built courier ships. It rested on a transport cradle which, in turn, squatted across the tracks in the floor; and despite their age, Meredith had the feeling that, like the Spinneret itself, both would prove perfectly functional.

"At least," Andrews murmured from beside him, "we know now why they needed to make the volcano crater so big. Should we take a look inside, Colonel?"

Meredith swept the room quickly with his eyes, noting the quantities of support gear stacked around the walls. "Not right now," he told the other. "I doubt there's anything here that would help us with Dunlop, and even if there were it'd take us too long to find it. We'll mark the door and bring the experts in later." Stepping back, he looked around for another way out of the first room. "Back to the elevator," he decided. "We must have come down one level too many."

The guess turned out to be right, and a minute later they were moving silently down a corridor in what Meredith hoped was the direction of the cavern. Assuming they didn't get lost, they should be in range of Dunlop's rebels in a couple of hours.

There had been a long and—or so it had seemed to Hafner—heated debate going on over by the barrier for nearly half an hour now. Digging his spoon into the self-heating can of field ration stew, Hafner strained to pick out as much of it as he could. The topic itself wasn't hard to guess: Perez's latest message, delivered via bullhorn from down the tunnel, had succeeded beautifully in its obvious goal of undermining morale. If he'd been telling the truth—if Astra really *was* rallying unanimously behind Meredith—then Dunlop's cabal was indeed facing ultimate defeat and possible death besides. Apparently, the argument centered around whether the rebels should continue to maintain what was being increasingly seen as an indefensible position or whether they should withdraw to the cavern control tower. Hafner couldn't tell which side Dunlop himself was on . . . but when the major strode up to him a few minutes later his lips were tightly compressed with anger.

"On your feet, Doctor—if you don't mind," he added in a token effort at courtesy. "We're moving deeper in."

"Oh?" Deliberately, Hafner scraped one last spoonful out of the can and ate it before leisurely getting up. "I'd have thought the other direction would be smarter."

Dunlop apparently had too much on his mind already for Hafner's pinpricks to have any effect. "We're moving you to the tower," he growled. "From the top we'll have a clear line of fire at anyone who tries to approach—and as you've already pointed out, Meredith

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won't dare shoot back at us there. Get in that car—we'll be leaving in a few minutes."

Hafner did as he was told, his mind spinning with unanswerable questions. Had Meredith pushed Dunlop into this move in the hope that he, Hafner, would find a way to escape in all the activity? Should he try and make such an opportunity?—or was the colonel expecting him still to be in custody when he made his counterstroke? *A pity we never planned for this kind of thing*, he thought, watching the soldiers breaking camp around him. *We could have set up contingencies, code words—something. I don't know how to play this by ear.*

But whatever move Meredith had planned, it didn't come before the cars began to move through the Spinner village. Looking out the window, Hafner noted with a growing tightness in his stomach that fourteen men—a quarter of Dunlop's force—had been left as rear guard at the tunnel barricade. *He's split up his people*, Hafner thought. *Somewhere on this trip the attack will come.*

It didn't come as they drove down the winding streets; nor did a squad roar up from behind as they piled out of the cars by the Great Wall. Unreasonably, Hafner tensed as the first four men slipped thorugh the narrow opening— unreasonably, since no one could have slipped past the tunnel guards to set up any such trap by the wall. Sure enough, a moment later they called an all-clear, and when Hafner and his knot of guards squeezed through he saw the terrain was indeed as empty as ever. Nothing moved but the usual number of Gorgon's Heads—

Moving Gorgon's Heads? Hafner felt his teeth clamp together as the anomaly hit him like a slap across the face. Ever since his first visit here he'd invariably found the Gorgon's Heads grouped with patient vigilance around the tower's base. Now, though, nearly half of them were clumping *toward* the tower from the rear section of the cavern . . . as if they'd gone to one of the exit tunnels back there to investigate intruders. . . .

Hafner's heart thudded in his ears as the rest of the details fell into place. Meredith had found a second entrance to the complex; he or Barner had led a team in through it; they had run ahead of the slower Gorgon's Heads and were waiting with stunners ready just inside the tower door. In five minutes it would all be over. . . .

And a hundred meters from the tower Dunlop abruptly signaled a halt. "Smith, Corcoran; go check out the tower entrance," he ordered two of the soliders.

"They can't get in without me," Hafner spoke up, a shade too quickly. "The Gorgon's Heads will stop them."

Dunlop eyed him for a long moment. "All right, then," the major said, "stand back from the machines and lob a couple of grenades through the opening. That shouldn't hurt anything, should it?"

Wordlessly, Hafner shook his head, his eyes on the soldiers moving toward the tower. They were barely five paces from the opening when, without warning, three khaki-clad men appeared in the doorway, the stunners in their hands sweeping the group of rebels. Even as he dived toward the ground Hafner felt a tingle ripple across his skin . . . and he'd barely hit the alien soil when the thunder of automatic weapons fire exploded into the air around him.

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His ears were still ringing from the burst when a hand grabbed his collar and roughly yanked him to his knees. Peripherally, he saw Dunlop's men stretched out on their bellies, rifles pointed toward the tower . . . but his main attention was focused on the pistol Dunlop held against his temple. A pistol gripped by a white-knuckled hand.

"Meredith!" the major yelled toward the tower and directly in Hafner's ear. "I've got Hafner here—you hear me? Surrender or I'll kill him. I mean it!"

He paused for breath or an answer . . . and in the silence Hafner heard, dimly, the sound of distant gunfire. Dunlop's hand twitched; but before he could do or say anything Meredith's voice drifted faintly from the tower. "Give it up, Dunlop. You haven't got a chance."

"I've got Hafner!" the major shouted again. "You want to see him die?"

"Don't be a fool," Meredith called. "You can't get into the tower, your rear guard at the tunnel's been taken—you've got no supplies and nowhere to run. What the hell is a hostage going to buy you? You *or* your men?"

"Just shut up!" Dunlop yelled.

"Major," a sergeant spoke up tentatively, "maybe we *ought* to surrender—"

"Talk of surrender will be treated as desertion," Dunlop cut him off harshly. "Meredith! I'll make you a deal. You call the UN ship and have them send down a shuttle for us. Then have your people pull back and let us leave here."

"What about Dr. Hafner?"

"I'll ask Msuya to send him back down once we're aboard."

"Forget it," Meredith called. "However, I'll make you a counterproposal. If you turn Hafner loose right now, I'll guarantee you all safe passage to the UN ship."

"You think I'm stupid enough to trust you? We're leaving, Meredith—you'd better call your people off." Cautiously, Dunlop stood up, hauling Hafner to his feet. "All right; everybody get up and fall back to the cars."

Slowly, even reluctantly, the soldiers complied—and because he was watching them, Hafner saw the shocked expressions as they began turning to leave. "Oh, bloody hell," someone muttered.

Preoccupied with the gunfire and shouted negotiations, Hafner had completely forgotten about the Gorgon's Heads. But the machines had obviously not forgotten them . . . and as he gazed at the six Gorgon's Heads standing motionlessly between them and the Great Wall, Hafner had the eerie feeling he was seeing a new level of programming being brought into play. With their tentacles poised like angry rattlesnakes, they seemed unnaturally alert, almost as if they sensed the tension and danger and were preparing to do something about it. Even Hafner, who was used to the things, felt uneasy; the effect on Dunlop's soldiers was an order of magnitude higher. The shocked expletives were punctuated by the clicks of rifles being put on full automatic.

"Take it easy," Dunlop snapped, pushing Hafner a step closer to the wall. "As long as we've got the doc here they won't touch us."

"Maybe, maybe not," Hafner put in, thinking quickly. "They're armed, you know, and I doubt they like having a

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supervisor as a prisoner." If he could get just a few steps ahead of the soldiers, on the pretext of calming the machines, and then duck behind one of them. . . .

"They're not armed, and they wouldn't understand what 'prisoner' means if you drew them a picture," Dunlop countered. "Come on, men."

"Hell with *that*," someone behind Dunlop muttered. "Meredith! I'm accepting your deal!"

Dunlop swung around, releasing Hafner's shirt as he brought his pistol to bear. "Back in ranks, you!" the major snarled—and Hafner leaped for the Gorgon's Heads.

He'd covered less than half the distance when something that felt and sounded like a small bomb blasted into his thigh, slamming him hard into the ground. A scream of pain welled up in his throat . . . but even as his clenched teeth blocked its escape he was deafened by a second thunderclap. He tensed for a new wave of agony, but it never came; and as the smell of ozone finally penetrated his pain-fogged consciousness he realized something else entirely had just happened. Raising his head with an effort, he looked back over his shoulder.

Where Dunlop had been standing a charred figure now lay sprawled on the ground. Around it the rebel soldiers stood frozen, their weapons sagging in their hands. From the tower a new group of soldiers was rushing toward them. "Well, what do you know?" Hafner heard his own voice say, as if from a great distance. "I guess they *are* still armed."

And then, thankfully, the darkness took him.

* * *

Chapter 29

Busy with the task of straightening things out in the Spinner cavern, Meredith wasn't able to get to the Unie hospital until nearly an hour after Hafner had been flown there. He arrrived to find Andrews and Carmen sitting together in the tiny waiting room. "Any news?" he asked, sinking into a chair across from them.

"It doesn't look like he's going to die," Andrews said. "They're not sure yet whether they'll be able to save his leg—the thighbone was pretty badly damaged."

Meredith nodded tiredly. "Yeah. Carmen . . . I'm sorry."

"Wasn't your fault, Colonel." Her voice was under control, despite the strain lines in her face. "Dunlop had to be stopped."

"Stopped and a half." He shifted his eyes to Andrews again. "You tell her?"

The other nodded. "Any idea yet what that flash was?"

"Simple old-fashioned high-voltage, apparently. Probably grounded through a cable-material base or grid underlying the cavern soil."

"So now the supervisors have been raised to demigod status," Carmen murmured. "Able to call lightning down on their attackers." She sighed. "I don't think I like the idea of Gorgon's Heads equipped with offensive weaponry."

Andrews shrugged. "It'll sure slow down any more would-be rebels."

"Oh, it's fine *now*. But what about twenty years from now?"

"We'll have the whole system figured out by then," Meredith assured her. "I've already made the supervi-

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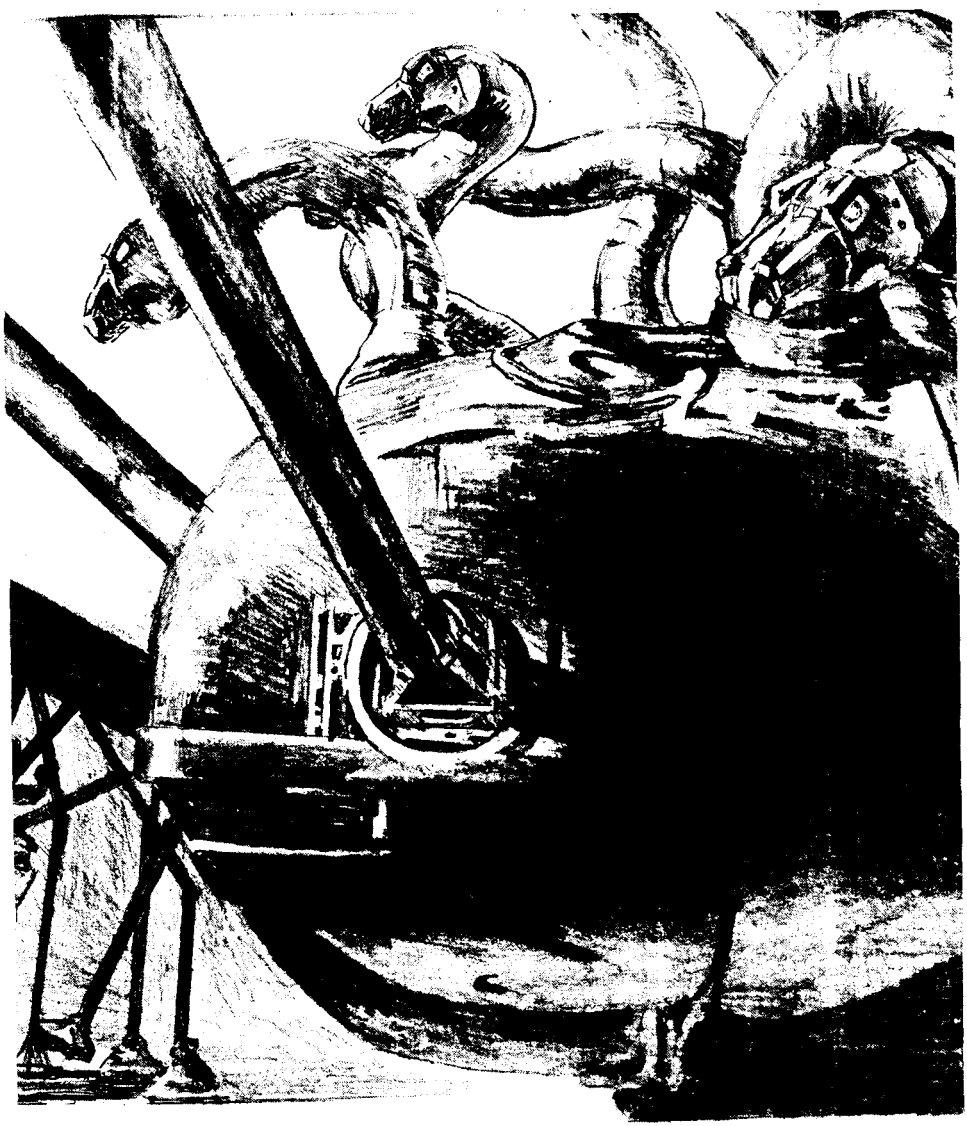

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sor/security programming a high-priority project. We'll be able to make new supervisors long before we need them."

"That wasn't what I meant." Carmen shook her head. "I mean it's just one more way the Spinneret's resources can be applied directly to warfare. Is that what the Spinners originally planned for this place, or is it just our human viciousness that's turning everything in sight to weapons?"

"There aren't a lot of things in this universe that can't be used for both good and evil," Andrews said. "If the Spinners were so morally pure that they couldn't see the negative uses of their stuff they would've been wiped out pretty quickly by the first group that did."

"Or enslaved." An idea was beginning to brush the back of Meredith's mind. "Maybe the Spinneret was built by slave labor."

Carmen shuddered. "That's a horrible thought. To be living on a slave planet—"

"You make it sound like living in Auschwitz," Andrews said. "Remember, whatever happened here it was all over a hundred thousand years ago."

"Besides which," Meredith said, "I doubt that the overseers they would need to run this place would have needed a lifeboat as big as the one we found."

Carmen blinked at him. "A *what?* Where is it?"

"It's stashed away in a room just off of the volcano cone," Meredith told her. "For the moment its existence is classified information—which is why Andrews is giving me such an odd look right now."

Andrews reddened slightly. "Sorry, Colonel, but I thought you weren't going to tell anyone else about the ship."

"I wasn't. I've decided, though, that we might want to try flying it . . . and for that we'll need a pilot."

Carmen's jaw dropped. "You don't mean . . . you mean *me?*"

"That's right. I want you to start figuring out the controls first thing tomorrow. You'll need the list of tentative translations that linguist—Dr. Williams—has worked out; I'll see she makes you a copy."

"But why me?" Carmen protested. "You've got lots of pilots who're better than I am."

"True," Meredith said frankly. "But after Dunlop's move there aren't a hell of a lot of people on Astra I can implicitly trust. You're the only one besides me with any flight experience; ergo, it's your baby."

Carmen shook her head in disbelief. "Lieutenant, will you kindly explain to Colonel Meredith that the chances of my figuring out an alien ship from scratch are about the same as swimming the Dead Sea underwater?"

"Actually, it shouldn't be as bad as you think," Andrews said. "If it *is* a lifeboat, it'll be designed to be as easy as possible to fly, with a lot being done automatically. Though—" he added with a glance toward Meredith—"I don't know what exactly we'd want to use it for."

"We'll figure something out once we know more about it," Meredith said, deliberately vague. "Incidentally, did the Whissst make their cable pickup okay?"

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"Yes," Carmen nodded. "And I didn't get a chance to tell you: the whole cable came out nonsticky."

Meredith's heart skipped a beat. "*Non*sticky? Uh-oh."

"Oh, there's nothing wrong," she hastened to add. "It's just that the cable's coated with about a millimeter's thickness of a rubbery material that seems to absorb or redirect the surface attraction. They tried peeling some from one end; it comes off quite easily and the cable underneath is like every other the Spinneret's turned out."

Meredith felt his tense muscles go limp with relief. "You had me worried for a minute. How are the Whissst taking it?"

"Oh, you know the Whissst outlook on life—they think the whole thing's a priceless joke. Do you suppose Dunlop's people changed some tower settings?"

"According to them, no one ever got up there." Meredith shook his head. "We can confirm that with Dr. Hafner later, but I suspect we're just seeing the result of getting that digging machine back on the job."

"Oh, right—I'd forgotten that." Carmen shook her head tiredly. "Brain's shut down for the night, I guess."

"Then you ought to take your body home and let it do likewise," Meredith said.

"I want to wait here until they know for sure about Peter's leg." She hesitated, as if casting around for a less painful topic of conversation.

Andrews saved her the trouble. "Colonel, what are we going to do about Msuya? Even if we can't prove it, it's pretty obvious the UN was backing Dunlop's power play. Can we get the Rooshrike to throw him out of the system?"

"Probably, but I don't know if it'd be worth it. Whatever we decide about immigration or direct aid to poor countries, we'll need at least halfway peaceful relations with the UN to make it work. Besides, Saleh's suspicious enough of what we're doing out here."

"But what if they try to stir up more trouble?" Carmen asked.

"How? With Dunlop gone who's left for Msuya to work through?"

"How about the five scientists Cris brought in? Surely they've been missed by now. What if Saleh threatens their families if they don't cooperate?"

"Again, how? Even a threat needs to be delivered, and our friends upstairs have no way of contacting them."

"They got to Dunlop," Andrews reminded him. "Remember those high-band transmissions? Msuya got that radio to him *some*how."

Meredith grunted. "I'd forgotten that," he admitted. "We'll have to figure out how that was done and shut down the pipeline." An obvious possibility occurred to him, but he decided not to mention it. "We can ask the Orspham to monitor that band, too, see if anything else shows up on it."

A motion through the swinging door's window caught Meredith's eye, and he turned as Astra's chief surgeon came quietly into the room, his pastel green coveralls stained with dried blood. "Well?" the colonel asked, tensing up again.

"I'd say he's got an eighty percent chance of keeping the leg," the doctor said with tired satisfaction. "A bad

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blood-flow interruption down there, but I think we got it restored in time. If so, the bone itself shouldn't be a problem; we can build a porous ceramic implant that the remaining pieces can grow into." His eyes had drifted to Carmen. "He'll be under sedation for at least another ten hours—longer if we decide he's stable enough for an implant operation—so you might as well go home."

"Thank you, Doctor; good job," Meredith said, getting to his feet. "Andrews, you may escort Carmen home and then hit the sack yourself. Good night, all."

Five minutes later, he was in his office. From the corner, his spare cot beckoned temptingly; turning his mind away from it he sat down at his desk and punched for the Martello duty officer. "I want to talk to the Orspham officer-in-charge," he told the other. "Get him for me on the secure radio channel. After that, see if you can locate a Rooshrike ship; I have a special equipment order that I need right away."

"Yes, Colonel."

Leaning back in his chair, Meredith checked his watch. The first contact would take several minutes to establish and perhaps triple that to get sufficiently deep into the Orspham hierarchy for what he wanted. And as long as he was waiting anyway . . . "Get me the UN ship, too," he instructed the officer.

There were several very salty things he wanted to say to Msuya.

Chapter 30

It took three weeks for Hafner's leg to recover sufficiently for him to begin taking short trips without a wheelchair—and, coincidentally, it was after the same three weeks that Carmen finally threw in the towel on her own project. "I'm just not getting anywhere," she told Meredith, slapping her notebook in frustration. "Loretta's translations make sense enough when I read them, but I just can't apply it to all the squiggles on the control boards."

"It's not a different language, is it?" he asked her.

She shrugged helplessly. "I can't even tell *that*. The same forty-six symbols are used, but that's all I know. If you want that ship figured out, you're going to *have* to let Loretta come and work directly on the ship with me."

Meredith stared out across the cavern, and Carmen held her breath. If he turned her down she'd likely spend the rest of her life aboard that stupid lifeboat. "As a small inducement," she said, "I can let you have Major Barner back for normal tower duty. Peter's told me he wants to start picking up his share of the load again, and while he obviously can't go running up and down the tower all day, he could certainly walk Loretta and me past the Gorgon's Heads and sit in the boat while we work."

Meredith turned back to her with a wry smile. "I think you've been our trade rep too long—you're getting entirely too good at this sort of bargaining." He pursed his lips. "All right," he said slowly. "As a matter of fact . . . yes, let's do it. We'll take them in to see it tomorrow morning; no word to either until then, understand?"

"Yes, sir—and thank you. I know you wanted to keep the ship secret, but I really think this is the only solution."

For a moment an odd look passed

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across his face . . . and then he again smiled faintly. "Yes. I think you're right."

Nodding, he turned and left. *Strange sort of comment,* Carmen thought as she headed toward the cavern exit. But she quickly put it out of her mind. So far, certainly, Meredith had proved he generally knew what he was doing.

"A Spinner space ship."

Msuya made no attempt to hide his satisfaction as he repeated Ermakov's words aloud. At last—at long last—he had the key that would bring him the political power he desired even as he crushed Meredith down into final humiliation and defeat. "Is it operational?"

"Williams didn't know, but it's obvious Meredith thinks so," the Russian's voice came from the speaker on the control panel. "She was shown the craft for the first time only two days ago."

"And she'll be working with the others until all the systems are deciphered?"

"She didn't say." Ermakov hesitated. "I think it would be wise to provide her with a new radio, if that can be arranged. She's been rather cool toward me ever since Dunlop's fiasco."

"Did you explain the radio in her tape player had been auto-vaporized and that there was no way Meredith could connect her with the revolt?"

"As a matter of fact," the other said dryly, "I believe it's the revolt itself that has annoyed her. Perhaps a small talk with her would remind her of her responsibility to the UN."

Msuya smiled to himself. Ermakov probably saw his own duty on Astra as furthering the goals of Mother Russia, with his UN allegiance a convenient facade. *Old habits die slowly,* he thought, *but the Soviets too will learn not to trifle with us.* "You may inform Dr. Williams that there is a backup radio built into her hair dryer," he told Ermakov. "Assembly and use are as she learned in her training. I will expect her to resume her normal contacts with me."

There was a short silence from the other end: Ermakov, Msuya decided, wondering if a second radio had also been planted on *him* . . . and wondering perhaps what else might be in his belongings. Msuya's smile widened; these operations always ran more smoothly when the carrot of greed was accompanied by the stick of fear. "I'll tell her," the Russian said at last.

"Good. Then let me hear your own report."

He listened with half an ear as Ermakov plunged into the arcane language of electronics, knowing the recorder would save the details for later scrutiny by the *Trygve Lie*'s experts. Little was new; that much even his layman's ear could tell. Still, a breakthrough could always occur, so when the Russian had finished he avoided criticizing the lack of progress and instead thanked the other and signed off.

Afterwards, he gazed for several moments out the porthole, watching Astra and the stars tumble by and savoring the news. At last—a piece of the alien technology that was self-contained and movable. A better chance to break Meredith's monopoly would be hard to find . . . and Msuya had no intention of letting the opportunity pass. As soon as Williams

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learned how the lifeboat worked, he would find a way to steal it.

Glancing at the room's clock, he rang the galley and ordered another pot of tea. It would be ten more minutes before the Indian computer man—Udani—was due to report in.

Chapter 31

Meredith read the report through twice, feeling the tightening of his stomach muscles that had become almost as common as inhaling for him. The bombshell he'd known was coming had done so . . . and at the worst time he could have imagined. Flicking the page from his screen back to the secure file, he muttered a curse and leaned back, gazing at the snow outside his window.

The timing was ultimately his own fault, of course, which was probably what rankled the most. Carmen had originally suggested council terms of one year; it had been his idea to cut that to six months. At the time it had seemed harmless enough . . . but at the time there'd been no Spinneret and no Spinneret profits. Or hot debate as to what to do with them.

The real problem was that both of the main factions had reasonable positions, a fact that made Meredith's job as ultimate decision-maker all the stickier. Perez, as usual, was pushing for immediate—if somewhat selective— immigration, arguing that while trapped in unfair sociopolitical systems the poor of Earth had no chance to improve themselves, no matter how much aid was given them. On the other hand, the group adopting Hafner's "*In Loco* option" pointed out the vulnerability of the Spinneret to takeover and possibly sabotage, and claimed to have developed a method by which unfair Third World governments could be successfully bypassed in giving assistance to their people. With Hafner on his crutches as their symbol and most credible spokesman, they were successfully cultivating the xenophobia that had simmered at a low level ever since the UN had tried to take over back in August. With only three weeks left before the election the campaigning was beginning to get uncomfortably warm . . . and relationships between the five supervisors increasingly strained.

And now this.

Raising his wrist, Meredith punched Carmen's number into his phone. There was no answer; disconnecting, he keyed for the Spinner cavern duty officer and left a message. Then, pulling his chair up to the desk again, he called up the main supply inventory and started to assemble the equipment he half hoped he wouldn't be needing.

He'd finished that job and was busy typing in a detailed interim instruction list when Carmen arrived. "You wanted to see me?" she asked, closing the door behind her.

"Yes." Meredith waved to a seat. "I need the lifeboat ready to fly before morning. Can it be done?"

Carmen froze halfway down to the chair seat, her eyes widening. "By *morning*?"

"Yes. You know how to handle it yet?"

Slowly, she sank the rest of the way to the chair, expelling a breath through pursed lips. "I don't know what to say. Yes, we've got all the controls relabled, and the operating manual we found on

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the computer makes the thing sound absurdly easy to run. But there's no way to check the engines or other gear until we understand how they work, and that's a *long* way in the future."

Meredith nodded. "It's a risk we'll have to take—though given the Spinneret's performance record I think it's a pretty safe one. All right. I want you, Dr. Hafner, and Dr. Williams to go back in there immediately, do all the checking you can, and try to figure out the launch sequence. You said once that the navigation system was designed for children—does that still hold?"

She nodded. "The computer displays your choices on a map and all you have to do is indicate which one you want. The selection's sort of odd; it includes only a few of the stars shown, but all of them are listed as being only five to fifteen days' flight away."

"Maybe it only lists the places emergency facilities were available," Meredith grunted. "All right. I'll be there sometime tonight with the supplies we'll need and our other passenger."

"Yes, sir." Her tongue flicked across her lips. "Uh. . . . May I ask . . . what's going on?"

Meredith sighed. "What's going on is the collision of three major events: the upcoming elections, the discovery of that Spinner lifeboat—" he hesitated—"and the cracking of the Gorgon's Head security system this morning."

Carmen's jaw dropped. "You mean the supervisor programming? I didn't realize Udani and Ermakov were that close."

"Apparently they were," Meredith said, sliding over the details. There were some things he didn't yet want Carmen to know. "You see the potential crisis, I'm sure. The five of us supervisors no longer have exclusive power over control tower access. We can now give everyone on Astra the ability to walk into restricted areas if we want to."

"Or anyone from the UN," she added quietly. "Is that what you're afraid of, that someone will leak that information to Msuya and bring down an attack?"

"That, and the nasty political games that could be played with it right here. Dunlop's coup failed largely because his only access to the tower was an untrustworthy hostage. What would happen if Perez, say, sneaked a dozen of his allies in there and made them supervisors?"

"Cris wouldn't do a thing like that," Carmen defended the other. But she nevertheless looked uncomfortable.

"Then those dozen fanatics haul him bodily into the tower and do the job themselves," Meredith shrugged. "The end result's the same."

Carmen nodded reluctantly. "I don't suppose we could classify the details or something."

Not hardly. "It wouldn't stay classified long enough," he said aloud. "In fact, as soon as it becomes public that we've *got* the code there's likely to be a political struggle for control of it."

"So how is taking a trip in the Spinner ship going to help?"

"It may allow us to buy some time by defusing the current battle over what we're going to do with our money. I'd rather not say any more about it just now."

Slowly, Carmen got to her feet. "I hope you know what you're doing," she

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said. "I'll get Peter and Loretta back to work right away. I presume I can tell them what we're doing once we're back aboard?"

"I suppose you'll have to." Meredith hesitated, then opened his middle desk drawer and withdrew a small stunner. "Neither of them is to return to the cavern once they know," he added quietly, handing her the weapon.

Her face was tight as she accepted it, holding it for a moment before slipping it into her side coat pocket. Then, without a word, she left.

Meredith waited until the door was again closed before exhaling loudly with frustration and relief. He could count on Carmen to do the job he'd given her . . . but he wished mightily he hadn't had to drop this on her shoulders. But there were so few people on Astra he could really trust.

And in the next hour he made calls to all of them, giving orders and alerting them to the special files he was setting up. After that he stretched out on his office cot and took a nap in anticipation of the long evening ahead.

It was pitch dark by the time he arrived at the security fence that now surrounded the tunnel entrance and the buildings grouped around it. The sentries passed his car through, and a few minutes later he was driving down the long tunnel, doffing his coat one-handed as the winter outside gradually changed to the constant late-spring of the cavern climate control.

Major Barner was waiting for him at the operations center, and together they drove to the Great Wall. There they transferred the supplies Meredith had brought from Unie into two of the open-roofed golf carts and drove to the tower. Parking next to the two carts already there, they rode the elevator to the top.

"Hello, Colonel; Major," Perez nodded as they walked into the main control room. "I thought mine was the last shift in here today."

"Something special's come up," Meredith told him, casually eying the three scientists working at the control boards. Only Ermakov was able to manage the proper idle interest in the conversation; Udani and the Brazilian physicist, Arias, were several shades too alert. "I need your help with some things downstairs," he told Perez. "Major Barner'll take over your job here for whatever time's left."

Perez shrugged. "Fine with me. Lead on."

"Carmen and Hafner've been doing some work in one of the far chambers," Meredith explained as the elevator returned them to ground level. "We're taking a couple of carts of special equipment to them."

"I noticed them heading off in that direction once," Perez nodded. "Neither will say anything about what they're doing. Though with the doctor's new interest in isolationist politics he doesn't talk to me about much of anything."

"You'll find out all about it soon," Meredith promised.

It was no more than a ten-minute drive from the edge of the cavern to the elevator connecting with the lifeboat bay. Loading the boxes into the elevator, they rode down.

"Welcome to Martello Spaceport East," Meredith said as they passed the

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Gorgon's Heads and triggered the door release.

Perez's reaction was a whispered Spanish oath. "A *space ship,*" he murmured. "Incredible!"

"That's what it is, all right. Come on—we've got to get these boxes inside."

The only entrance Meredith knew of was halfway up the curved side, accessible via a narrow accomodation ladder. Together he and Perez manhandled the supplies aboard, stacking them just inside the hatchway. Then, mentally crossing his fingers, he led the way forward.

Carmen, Loretta, and Hafner were waiting in the control room, their expressions tight. "We heard you come in," Carmen said quietly. "Everything's ready, as far as I can tell."

"Ready for what?" Perez asked suspiciously, his eyes flicking over the room.

"We're taking a short trip," Meredith said, gesturing to a row of seats well away from any of the control boards. "If you three will strap yourselves—"

"A trip where?" Perez interrupted.

"To the Spinners' home world."

Even Carmen's eyes widened at that. "You're not serious," Perez growled. "I, for one, am far too busy to take any trips—certainly in an untested alien craft."

"I'm sure Major Barner and Dr. Nichols can handle cavern duties until we get back," Meredith told him, drawing a stunner from his pocket. "Let's avoid the need for force, shall we? I'd like everyone to be on speaking terms during the voyage."

Perez sent a hard, almost accusing look at Hafner and Carmen. "What about the election?" he asked, turning back to Meredith. "Or is this simply an elaborate way of eliminating my influence on Astra?"

"You'll note Dr. Hafner is also going with us," Meredith pointed out. "If you don't consider that being even-handed, I'll simply mention that Major Barner has instructions to postpone the elections until we return."

"So what are you trying to prove? That you're still the man with all the power on Astra?"

"I've got no more power than anyone else in this room," Meredith said flatly. Turning the stunner around, he tossed it to Perez. "What I've got is curiosity and a hell of a lot of unanswered questions. We've got the chance now to go see what the Spinners did with all the cable they took from Astra; maybe even find out what ultimately happened to them. It seems to me that anyone who's really interested in Astra's future should be interested in knowing whether the simple fact of owning the cable contributed in some way to their destruction. Doesn't it seem that way to you?"

For a long moment Perez stared at him. Then, without a word, he walked over to the seats Meredith had indicated and sat down, dropping the stunner almost contemptuously on the seat beside him. Meredith stepped past him, retrieving the weapon and putting it away as he joined Carmen by the forward viewport and wraparound control board. "Let's go," he told her.

Turning back to the board, she pressed a handful of buttons. Beneath them, the deck vibrated momentarily; and then

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they were moving along the tracks toward the double doors. Carmen consulted a screenful of Spinner characters and a translator display that had been set up beside it and adjusted another set of controls. "It appears to be automatic now until we're off the planet," she told Meredith, her voice tight. "After that I just need to indicate where we're going on the map I told you about."

"Right." They were into the next room now and approaching the second set of double doors. Sliding into the seat next to Carmen, Meredith took a minute to puzzle out the alien restraining straps. By the time he looked up again they were slowing down in a machinery-packed room that seemed to have no ceiling. "Under the volcano cone," he grunted, eyes probing the jungle of oddly-shaped devices and cables surrounding them. "Um—up ahead, by the wall: isn't that a duplicate of the transport cradle we're riding on?"

"Looks like it," Carmen agreed. "Maybe the empty room we passed through originally held a second lifeboat."

"That might explain why this one was never used," Hafner put in quietly from behind him. "By the time they left there weren't enough of them still here to need two ships."

Meredith craned his neck to look at the other. Seated next to Loretta, his injured leg sticking awkwardly out from the ill-fitting Spinner seat, the scientist had the look of someone trying hard not to pass judgment prematurely; and it occurred to Meredith that whether or not he succeeded in holding Astra together he stood a fair chance of losing whatever respect and trust he'd built up with these people. But it was far too late to regret his decision. "You think there may have been a plague or something?" he asked Hafner.

"Or else they were running with a skeleton crew at the end. I suppose that's one of the things we're hoping to find out, isn't it?"

Meredith nodded and turned back. The lifeboat had stopped now, and a slight movement among the thinner cables outside caught his eye. "Evacuating the air," he muttered. "Must be going to launch us with the gravity nullifier."

The words were barely out of his mouth when the room seemed to tilt away in front of him and, simultaneously, the viewports blackened. "What —?"

"We must be starting up the shaft," Carmen said. "The windows opaque when the boat turns nose-up, probably to protect them."

"Nose-up?" The deck felt perfectly normal beneath him. "—Ah. So the Spinners could create gravity as well as eliminate it."

"In a craft this size?" Amazement momentarily pulled Perez out of his tight-lipped silence. "Incredible."

"Yeah." Just one more item, Meredith thought grimly, to add to Astra's list of militarily useful hardware.

He hoped to hell the Spinners, whatever had happened to them, had left behind some answers when they went.

"It was pure luck we spotted them," the *Trygve Lie*'s captain told Msuya, his tone indicating he still wasn't sure he should have awakened his superior.

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"As per instructions we had a telescope trained on Olympus—"

"Yes, yes," Msuya interrupted him, struggling into a robe as his feet searched the floor for his slippers. "Have they shifted yet?"

"No, sir," the other said. "Actually, they seem more like they're heading somewhere in Astra's outer system."

"Or else are trying to get far enough out that we won't be able to get their direction vector when they go," Msuya snarled. It was the sort of precaution he'd expect Meredith to take. "After them, Captain—I want to be right next to them when they shift."

"Yes, sir. We'll leave orbit in five minutes."

Nice try, Colonel, Msuya thought, smiling with grim satisfaction as the alarms sounded their warning of the upcoming activity. *But you can't get that ship away from me. It'll be mine . . . or it'll be no one's.*

Lurching a bit as the *Trygve Lie*'s rotation slowed, he headed for the bridge.

Chapter 32

"So why haven't we shifted?" Perez demanded.

"Keep your RAM cool," Meredith shot back over his shoulder, trying to hold his own fears in check. "Well?" he added as Carmen blanked the screen and leaned back in her chair.

She waved her hands helplessly. "Every diagnostic I can find says nothing's wrong," she said. "The course we're on seems deliberate, as opposed to being random, so I can only conclude the boat knows what it's doing. Or at least thinks it does."

"Great." Meredith pondered. "You said the computer indicated four days to Spinnerhome?"

"Spinner days, yes. About a hundred twenty hours total."

"Does our course indicate anything that far ahead that could be our destination? A larger pre-programmed ship, say, that has the necessary star drive?"

"There's no way to tell at this range." Carmen shook her head.

"This is ridiculous," Perez snorted. "Something's obviously gone wrong. Let's give up and go back to Astra."

"I don't think that would be a good idea," Meredith said. "There's a repulser flare moving on what looks like an intercept course off our starboard side."

"What?" Perez moved to the side viewport to look. "Who is it?"

"Does it matter? Whoever it is would probably be willing to risk even a Spinneret cable embargo in exchange for this one ship."

"But how did they spot us? Carmen—you said we were using a gravity drive of some sort, right? So *we're* not putting out a flare of our own—"

"Msuya will have been watching from the UN ship," Loretta put in quietly. "He knew about the lifeboat."

Carmen twisted around. "He *what?* How could he?"

"Because she told him," Meredith said calmly. "Don't look so surprised; it's been obvious ever since Dunlop's coup attempt that Dr. Williams and her friends were spies planted on us."

"But the Ctencri—" Perez trailed off as cold anger replaced the shock on his

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face. "*Damn* them. They probably went straight to Saleh with my letters." He turned to Loretta. "So they hired you to come here and learn the Spinner language for them."

"They pressured me into doing it," she corrected tiredly. "And now they have my two children. That's the pressure Msuya's been using on me lately."

Perez snorted, looking back at Meredith. "*You* seem remarkably phlegmatic about all this. If you knew she was a spy, why did you let her aboard?"

"What choice was there?" Meredith countered. There were other reasons, but if the UN ship had a chance of overtaking them he'd best keep his hole card private. "We needed her to decipher the controls, and we'll probably need her at Spinnerhome even more."

"If it helps, I don't really want Msuya to win out here," Loretta said. She looked at Hafner. "Especially after . . . what he tried to do through Major Dunlop. If I'd known he was going to use violence—"

"Well, he hasn't won anything yet," Meredith told her. "Why don't you come up here and double-check Carmen's translations, make sure we're not missing some warning light or something."

Loretta nodded and moved to the control board. Meredith took one last look at the distant repulser flare and walked over to Hafner. "You're very quiet, Doctor," he said, sitting down next to him. "Still mad at me for shanghaiing you like this?"

Hafner smiled. "All you had to do was ask, you know—I wouldn't have missed seeing Spinnerhome for the world. No, actually, I was just sitting here trying to figure out what kind of star drive can take us anywhere from a dozen light-years to several hundred in the same few days."

Meredith frowned. "Is *that* the scale Carmen's nav map shows?"

"I don't see it making sense any other way. What we've got here, it seems to me, is that old standby of science fiction, the instantaneous-jump drive."

"Um." Meredith chewed on his lower lip. "Then the five or six days between planets is just the insystem travel time between port and . . . what?"

"A safe distance from large masses, perhaps, or a low dust density," Hafner suggested. "Hard to tell what they came up with. The immediate question, then, is whether Msuya will see anything we don't want him to see when we go."

"Before that comes the question of his capturing us," Meredith said dryly.

"Won't he run out of fuel first? A couple-three days of constant acceleration—"

"Won't bother him. The Rooshrike gave me the specs to Ctencri courier ships a few months back; it turns out they're designed for long-range insystem work as well as interstellar."

"Oh." Hafner pursed his lips. "I don't suppose we're armed or anything."

"I doubt it. Maybe Carmen can program a little more speed for us." He stood up, paused as Hafner touched his arm.

"Did you know Msuya would follow us?" the scientist asked quietly. "In other words, do you have a plan?"

"Afraid not," Meredith shook his head. "I thought he'd see us emerge from Olympus, but I expected to be long

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gone into hyperspace before he could do anything about it. We'll just have to hope it takes him long enough to figure out how to perform deep-space piracy for us to reach our jump point."

"If not, we break out the cutlasses?"

Meredith gave him a reassuring smile and moved off.

"You're just making this harder on yourselves," Msuya growled, the distortions caused by the Spinner speaker not quite masking the other's rage. "You obviously can't control your ship well enough to escape, and it's clear your star drive's broken. I assure you I'm quite willing to disable you if I have to."

"If you really wanted to shoot us down, you could have done so anytime in the past eight hours," Meredith reminded him. Their talk had been going on sporadically for nearly that long now, and he, for one, was getting sick of hashing over the same territory. But as long as Msuya was reluctant to damage his prize—and as long as the odd gravitational effects from the lifeboat's drive continued to make a boarding dangerous for both ships—the impasse was a remarkably stable entity. "As I've said before, if you can't offer suitable guarantees for our safety, we'd just as soon go down with the ship."

"You talk very casually of throwing your lives away," the UN official spat out. He, apparently, was getting impatient as well. "Let me tell you a secret: sacrificing yourselves will no longer protect the Spinneret's secrets. We —*I*—know everything you do about the operation of your precious machine."

"Yes, Dr. Williams has been telling us about your little spy network. Not a particularly clever setup, you know—I'm sure the CIA or KGB could have designed something better for you."

There was a moment of silence, and in the gap Carmen snapped her fingers twice. Meredith looked at her; she pointed urgently to his seat belts and then to the screen. Against the navigation grid had appeared two spots that flickered back and forth from red to orange; directly between them sat the Lorraine-cross course indicator. Meredith raised his eyebrows questioningly, got an uneasy shrug in return, and began strapping in.

"So you know about that, do you?" Msuya said at last. "Well, it'll do you no good. Arrest them—execute them if it makes you feel any better—but understand that all I need to control the Spinneret is already in my hands."

In front of Meredith, the viewport opaqued. "This must be it," Carmen muttered tightly.

"Good-bye, Msuya," Meredith said. "We'll look for you when we get back."

"Meredith—!"

From somewhere aft came a shriek like a parrot being smothered in cotton; an instant later Msuya's voice was cut off as a brief wave of vertigo threatened to turn Meredith's stomach. The nausea subsided . . . and when the viewports cleared again a dull red sun the size of a basketball sat directly in their path.

"Well," Meredith said, letting out a breath he hadn't known he was holding. "I think we're here."

"Wherever 'here' is," Perez said, climbing stiffly out of his seat and coming forward to peer over Carmen's

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shoulder. "What was that scream just before the gravity jumped? It sounded like we were losing the whole tail section."

"I don't know." Carmen indicated a readout. "But the local grav indicator went crazy right then."

"How crazy?" Hafner asked. "Like we'd skimmed the edge of a small black hole?"

"Is *that* what those two spots on the screen were?" Carmen asked.

"Two?" Hafner frowned.

"Wait a minute," Perez growled. "Are you saying we just flew *through* a black hole?"

"The course marker went *between* the two spots," Meredith told him, "so we probably didn't hit either one. Though why we had to get even that close, I don't know."

"Possibly the high gravity gradient's needed to trigger their star drive mechanism," Hafner suggested thoughtfully. "And if that's true, it would explain why there are so few jump points listed on the boat's map."

"It does?" Carmen frowned. ". . . Oh. There aren't going to be many systems with even a single black hole nearby, let alone a pair. So Astra was picked for the Spinneret for no better reason than its accessibility?"

"With maybe a minor point being its proximity to an asteroid belt. They may have brought down some of the bigger asteroids themselves." Hafner craned his head to see out the viewport. "Any idea where Spinnerhome is out there?"

"It doesn't show on the displays yet. But the boat seems to know where it's going."

"Then it may be confused," Perez said softly. "This isn't the Spinners' system."

Meredith spun to look at him. "What?"

Perez gestured toward the viewport. "The sun in the cavern is yellow."

For a long minute there was dead silence in the room. "Maybe it's a double star system," Loretta offered at last. "With a yellow star behind, where we can't see it."

"In that case we should be veering to go around the red one," Perez pointed out.

"Maybe we will, once we build up more speed," Carmen said.

"Maybe," Perez said darkly. "Maybe not."

Meredith broke the silence that followed. "There's no point in worrying about it now. We're all dog-tired; let's go aft and find somewhere to sleep. In a few hours we'll have a better idea what the boat's got in mind."

The main passenger section consisted of three airline-type cabins, each with twenty tall, thin chairs that flattened out into beds. By unspoken agreement they all stayed together, stretching out in the five beds closest to the forward door. One by one, with little conversation, they went to sleep.

Meredith was the first to wake, six hours later, and when he padded to the control room he found Carmen's hunch had been correct. The red sun, noticeably larger, was now sitting off their port bow, while the screen indicated a course that would come perilously close to the edge but clearly miss it. Bringing one of the supply boxes forward, he improvised a table and was setting out five

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field-ration breakfasts when the others drifted in.

"So Dr. Williams was right after all," Perez said grudgingly after surveying the situation. "Any sign of the other sun yet?"

"Not that I could see," Meredith said, waving Loretta to the seat beside him. He didn't blame the others for being cool toward her, but it was about time to put a stop to that nonsense. He was opening his mouth to do so when Perez suddenly yelped.

"Hey! What was that?"

"What?" Carmen asked, joining him.

"A flash of yellow near the middle of the sun," he said, pointing. "Just for a second."

"A solar flare?" Meredith ventured.

"Doesn't sound like it," Hafner grunted, struggling to get out of his seat. Loretta moved to help him. "Flares are hot spots, all right, but a yellow burst from a red sun seems pretty excessive. Whereabouts was it?"

"A little below the center—there! There goes another one!"

This one lasted several seconds before winking out as abruptly as it had appeared. "That *is* damned odd," Meredith agreed uneasily. "Carmen, is there some way you can get spectrum or intensity data on those?"

Carmen was peering at the translator screen. "I don't know. I don't remember seeing anything like that in the manual. Of course, I wasn't looking for it, either."

"Dr. Williams, help her," Meredith ordered. "The rest of you keep an eye on the sun."

They counted twelve more of the brief flashes before Carmen and Loretta found a spectrometer program for the boat's sensors. It was, unfortunately, useless for their purposes, lacking any fine-directional capability.

"Could there be a ring of asteroids grazing the surface?" Perez suggested. "Maybe the flares occur when one of them impacts."

"They're still too short-lived for that," Hafner shook his head. "Besides, there's no real 'surface' to a star; just a steadily-thinning atmosphere."

"Sure there's a surface," Perez retorted. "I can see it."

"You *what?*"

"Sure. Watch the edge—the stars disappear right behind it."

Closing one eye, Meredith held his hand up to cut out as much of the sun's glare as he could. Sure enough, the stars disappeared behind the edge with no preliminary dimming that he could detect. Shifting his gaze, he found himself looking into Hafner's eyes. "Are you thinking the same thing I am?" the geologist asked carefully.

Meredith's mouth felt a little dry. "It's impossible," he said. "The size alone—no, it can't possibly be."

"What can't be?" Carmen demanded.

Hafner waved at the viewport. "That's not a star," he said quietly. "It's a gigantic artifact. A sphere, enclosing the Spinner sun . . . and probably Spinnerhome, as well."

Chapter 33

"It's called a Dyson sphere," Hafner explained, the dull throbbing in his head and leg forming an odd counterpoint to the giddy feeling of unreality seeping into his brain. After the Spinneret he'd

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thought he could handle anything. But *this*— "It was supposed to be a way for civilization to trap all the energy from its sun. Odds are that thing's made of sheets of cable material, supported by a framework of the cables themselves."

"I'll be damned," Meredith murmured. "That *would* explain what they needed a planetworth of cable for, wouldn't it?"

"Possibly," Carmen said slowly. "But it doesn't explain why they left the Spinneret running."

"We're back to their assuming they'd be coming back when they left," Hafner agreed. Something was gnawing at the back of his brain, something about that huge artifact that seemed wrong. But he couldn't place it. "I gather the boat's heading for a passage through the sphere. Colonel, you mentioned last night you brought a telescope along?"

"A small one, yes." Meredith turned away from the viewport. "Perez, give me a hand and we'll set it up in here."

The two men left, and Carmen and Loretta resumed their examination of the boat's manual. Easing into the seat beside Carmen, Hafner stretched his leg out and tried to nail down what was bothering him.

He hadn't succeeded by the time Meredith and Perez had the telescope set up between the two control panel seats . . . but an hour later, as Carmen was calling attention to a curious flattening of the sphere's limb, he got at least a piece of it.

"Best guess is that the sphere wasn't finished and that we're coming up on the uncompleted edge," Meredith was suggesting as Hafner limped over from the side viewport to the group huddled by the telescope.

"Seems silly to start a project that size and then not finish it," Carmen said.

"Their Congress must've cut the funding," Meredith said dryly, eliciting a snort from Perez.

"Or maybe they discovered it wasn't working," Hafner offered. "A superconductorlike cable material would be great for collecting light and particle energies, but I'm not at all sure how you'd then turn the heat into something useful."

"What's wrong with thermocouples?" Perez asked.

"You need a temperature difference somewhere for those to work," Meredith said. "As a matter of fact, it seems to me that almost *all* energy-extraction schemes require an energy differential."

"Maybe they know a method that doesn't," Loretta suggested. "After all, they built at least half the sphere before they quit."

"The Poms told me the radiation spectrum from cable material lacks some lines," Carmen said doubtfully. "Could something like that be the 'cool' part of the extraction cycle?"

"That's as good a guess as any," Meredith shrugged. "Maybe we'll know better when we get a look at the inner surface."

"There's something else, though," Hafner muttered. "Something else that's not right. . . ."

"Well, when you think of it, let us know," Meredith said, peering through the telescope. "Carmen, is there any-

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thing like an emergency beacon aboard that we ought to trigger?''

''It's already on,'' Loretta told him, pointing to one of the indicators. ''I believe it's been going since we got here.''

''And no response. Doesn't look very promising.''

Unnoticed, Hafner returned to the side port and his thoughts . . . and as he stared at the bright red sphere a disturbing idea slowly began to take shape. An interpretation so wildly improbable, in fact, that he spent the next two hours searching his memory for something —anything—with which to refute it. Instead, everything he knew about the Spinners and their cable merely strengthened the theory. *But there's still so much I don't know,* he told himself when he finally gave up the effort. *Better not to tell anyone else. Not just yet. . . .*

He spent the rest of the day struggling to hide his feelings from the others. Fortunately, everyone was so busy discussing and observing the sphere that they didn't seem to notice his silence. When, during dinner, Carmen did, he passed it off as temporary discomfort in his leg. She didn't press the point then, but when they all returned to the passenger cabin that evening she casually took the bed next to his, and a few minutes after Meredith turned down the lights he sensed her lean over the narrow gap separating them.

''You all right, Peter?'' she whispered. ''You're quieter than I've ever seen you.''

In the darkness he shook his head. ''There's nothing you can do,'' he whispered back, ''If I'm right . . . and we'll know in a day or two.''

''Want to talk about it?''

''No. Not until I know for sure.''

She didn't say any more, but a moment later her hand reached across to touch his. He gripped it tightly . . . and, eventually, fell asleep.

By morning the sphere filled nearly half the sky, giving a bright red glow to everything within range of a viewport and triggering a low hum that Carmen finally identified as the boat's cooling system. The light was too intense for telescopic viewing to be safe, but Perez discovered that by using a piece of cardboard with a small piece cut out enough of the glare could be eliminated to see the holes through which glimpses of the true sun had earlier been visible. In all he located twenty-eight gaps of various sizes, their positioning on the surface following no pattern anyone could detect. For awhile there was a lively discussion of their possible function, but it eventually died from lack of data. Hafner stayed out of the discussion; for him, the gaps merely added to his gloom.

And two hours after lunch the lifeboat rounded the ragged edge and entered the sphere.

''You know,'' Carmen breathed, ''I don't think I really believed Peter was right . . . until now.''

There were murmurs of agreement; and even Hafner found his depression lifted temporarily by the sheer grandeur of the sight. This side glowed, too, but its intensity was considerably muted, as if the Spinners had coated their superconducting material with something to

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send the light outward. Attached to the sphere they could see clumps of rock spaced at regular intervals in all directions; on the very closest the telescope was just able to pick out spiderweb-thin lines leading outward like latitude-longitude markings on a globe.

"Asteroids," Meredith identified the rocks, shading his eyes as he peered farther away down the vast curved surface. "Held in place by a framework of Spinneret cable. So *that's* why they needed something that strong—they've got to support umpteen tons of rock against the sphere's rotation."

"Ideal for the job, too," Perez murmured. "Flexible enough that you don't need to smooth out the asteroid much to make good contact."

"What are they for?" Loretta breathed. "The asteroids, I mean."

"Customs ports, maybe," Perez suggested. "Those holes must have been how ships were going to get in and out when the sphere was finished."

"More likely they were where the antigrav stabilizers were located," Hafner spoke up. "Even rotating, the sphere's position isn't really stable; they'd need some way to make periodic corrections." He hesitated. "And they must also be where the sphere's heaters are set up."

They all turned to face him. "The *what?*" Perez asked.

Hafner took a deep breath. "We were wrong about the sphere's purpose. Even if it collected and radiated every bit of the interior sun's light it couldn't possibly get any hotter than about three hundred degrees absolute—room temperature, essentially. But in fact it's at least ten times that hot. There's no way that could happen without a massive input of energy."

"That's ridiculous," Perez snorted. "You must have made some order-of-magnitude error."

Hafner shook his head. "I almost wish I had. But it's a perfectly straightforward Stefan-Boltzmann calculation."

"All right, then, let's assume you're right," Meredith said. "Can you give a reason why they'd go to that kind of trouble?"

"It wasn't just to heat their planet up," Hafner said. It was odd, a small observer in his brain noted, how even now he avoided simply coming out and saying it. "Orbiting reflectors could have done that. A smaller sphere would have done if they'd decided they wanted a red sky. It wasn't built to live on; they wouldn't have needed to heat it like that and I suspect we'll find the main shell is too thin to support much weight." He paused. "Colonel Meredith . . . what would you do if you knew there was an enemy looking for your position and you didn't have the strength to fight him?"

Meredith's eyes gazed unblinkingly into his. *He's figured it out,* Hafner thought. *I was right, then: it* does *make sense. God help them . . . and us.* "I would retreat," the colonel said quietly. "Or else try and camouflage myself. Is that it?"

"No," Carmen whispered. "You don't mean—they built the sphere to make themselves look like a red giant star system?"

Hafner nodded. "It fits, doesn't it? The superconducting shell to spread the heat out evenly; the missing spectral lines you mentioned undoubtedly corresponding to those of a real red giant.

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The hard edge wouldn't be noticed at any real distance, even if they thought to look for it."

Perez stirred. "And the lack of completion. . . ." He left the sentence unfinished. "The holes aren't entrance ports, then, are they?"

"Blast damage," Meredith murmured. "Whoever they were afraid of found them too soon."

For a long moment there was silence. The edge of the sphere was slowly receding, and looking ahead Hafner thought he could see a small dot of reflected light a few degrees from the sun. Spinnerhome, undoubtedly. He wondered how much of the devastation of that long-past war would be visible from orbit. He wasn't looking forward to finding out.

"But *why?*" Loretta finally voiced the question Hafner knew they were all thinking. "Why did they sit here and let themselves get blown up? Surely they knew these enemies were coming—they had to be *centuries* building this thing. Why didn't they use the time to build up their armaments, or even just pick up and leave?"

"Maybe they had nowhere else they could go," Carmen said. "Their star drive only allows them limited choices, remember."

"What about Astra?" Loretta countered. "It must have been habitable before they drained all the metals out of it."

"I think Carmen's essentially correct," Hafner said, "except that it may not have been a matter of conscious choice. I think they were so tied to their own world that they simply *couldn't* relocate elsewhere."

"Ridiculous," Loretta snorted.

"You're forgetting the Spinner cavern," Meredith said, shaking his head slowly. "You're right, Dr. Williams; they *could* have lived on the surface while building and operating the Spinneret. But they chose instead to spend enormous time and effort in duplicating their home planet's environment, from the sunlight down to even the proper odors. If they could take the time from the defense of their race to do that, I can well believe they considered it something they couldn't live without. You shake your head; but remember we're not talking about human beings but about aliens. They're under no obligation to think and react like we do."

"Or vice versa?" Perez's smile was bitter. "You're too kind to our species, Colonel. How many wars have been fought, do you suppose, because two groups of people each considered the same little plot of land to be theirs? How many people have died in battle or withered in refugee camps because they would not move over to a new place that was often every bit as good as the one their ancestors had lived on? You have an affluent, mobile American's view of land, I think. The rest of the world differs from the Spinners more in degree than in substance."

"Point," Meredith admitted. "But you're too kind in turn to modern Americans. I might not be willing to die for any given acre of land, but I *would* do so for my country as a whole. And when my car was stolen once I genuinely wanted to machine-gun the guy who did it." He looked out at the sphere.

"You see what that means, of course,"

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Hafner said, the words trying to stick in his throat. "We can't allow humanity to get stuck in a single spot like the Spinners did." He looked at Carmen. "You remember—once—I said the Spinneret cable might have been used to make a giant cage for something. I was right; but it was a cage for their whole race." He shook his head. "And the only way to make sure that doesn't happen to us is to open immigration to Astra."

The others all looked at him. "You mean that?" Perez asked, frowning. "You're changing sides?"

"Don't flatter yourself," Hafner snapped. "I still think bringing a bunch of people into what's essentially a make-work situation is stupid. But putting our eggs in two baskets is at least a little better than leaving them in one. So go ahead: bring in your spies and parasites. I don't care anymore."

"*I* care," Perez shot back, glancing once at Loretta. "I was the one who originally worried about spies' stealing our secrets, remember. And I don't want to bring people to Astra just for the sole purpose of having warm bodies lying around. If we can't get useful jobs for them—"

"Ease up, both of you," Meredith interrupted. "You'll wind up adopting each other's basic politics in a minute. I brought you here to end this battle, not to start it over again backwards."

Perez cocked a suspicious eyebrow. "I thought we came to learn about the Spinners and the cable."

"We did; but since all the information I wanted probably got blown up with the rest of the planet, I'm going to have to try something else. Let's start with the problem and go from there."

Briefly, he outlined the opening for terrorist attack that possession of the Gorgon's Head security code opened up. Hafner felt a shiver climb his spine; he hadn't realized they were that close to solving the code, and he certainly hadn't thought through all the implications. "As long as we don't know how to correct any sabotage that gets done to the control settings, we're extremely vulnerable to a Dunlop-style attack." Meredith concluded. "And the stronger the political tensions on Astra, the more likely that kind of operation becomes. What we have to do is drastically tone down the disharmony, at least past the election and probably a year or so beyond; and what *that* means is eliminating these budding political parties."

"And how do you intend to do that?" Perez asked. "A ban by royal decree?"

"No, I'm simply going to knock the props out from under them. Since they're both single-issue groups, all we need is for their leaders to publically come out for a compromise. That'll take the wind out of everyone's rhetoric, at least until the new Council is elected."

Perez snorted. "So you dragged us all the way out here to talk about a compromise? We could have done all this back in your office."

Meredith gazed at him. "No," he said quietly. "I brought you here to tell you that you *will* accept a compromise—either mine or whatever else we can all come up with. One way or another, we're going to be in agreement before we leave this ship."

"Or else?" Perez prompted coolly.

"Or else you, Perez, will be arrested

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for treason. It was *your* actions that brought Dr. Williams and her fellow spies from Earth and ultimately resulted in Dunlop's coup attempt—and, yes, I *can* prove all of that in court. I think even your most avid supporters would fade back into the woodwork at that point."

"Blackmail," Perez nodded. "Do you have something similar to hold over Hafner's head, or am I a special case?"

"Dr. Hafner doesn't have your talent for influencing crowds" the colonel said. "Besides, I expect him to be reasonable on this."

Perez sighed. "You know, it gets very tiring after a while *always* to be misunderstood," he said, shaking his head. "Did it never occur to you that I might *jump* at the opportunity to find some middle ground; that I might possibly prefer to lose half of my wish-list in exchange for not making a long-term enemy?"

"It did," Meredith nodded. "But I didn't want to rely on it. You're very good at getting things done your way; this time, we're damn well going to do things *my* way. So you want to be a statesman? Here's your chance to get in some practice."

And with that he began to outline his plan.

The discussion lasted the better part of that day and the next, and through it all Perez indeed proved himself able to compromise. By the time the boat went into orbit around Spinnerhome and clicked itself back to manual control most of the details had been satisfactorily worked out, leaving all aboard free to perform what studies they could on the shattered world below them.

It was as depressing a sight as Meredith had ever seen. Even after thousands of years the huge icecaps that must have formed after the saturation bombing still covered nearly a quarter of the planet. Elsewhere, a few patches of green and yellow could be seen through the clouds, but most of the land seemed to be desert hues of brown and gray-red. Nothing but solar noise existed on any band the radio could pick up; nowhere were any lights visible. By the fifth orbit Meredith called it quits. "Whoever they were, they were apparently very thorough," he said grimly. "If any of the Spinners had survived they should have been able to recover at least some of their technology by now."

"That could be us, someday," Carmen said with a shudder.

"Maybe we've got a chance to avoid it now," Perez said. "At least total extermination—" He looked at Meredith. "Have we seen enough? It seems to me we ought to be getting back."

Meredith nodded, doing a rapid calculation. Four Spinner days each way, another one in orbit at Spinnerhome —eleven Earth days total. Plenty of time for Msuya to have made the necessary arrangements with Saleh and made it back to Astra. "Yes," he nodded. "Let's go home."

The return trip was uneventful but subdued. Meredith spent a great deal of time with the lifeboat's operating manual, taking advantage of the rare leisure time to learn as much as he could about the craft and the Spinner language generally. The others, too, seemed to keep

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to themselves, as if each needed to sort out privately the revelations of the past few days. At times Meredith found himself staring out a side viewport at the Spinner's grand failure, wondering if his own plans would crumble as theirs had, and wishing he could discuss them with someone. But he resisted the temptation. It was too late to change anything now, and there was no point in everyone else's losing sleep, as well.

And at last the twin black holes appeared on their screen; and when the nausea of the jump had passed and the viewports cleared again they were indeed home. Astra, marginally closer to the jump point than when they'd left, was a bright spot with an almost discernible disk. Surrounding it were smaller flecks of light that resolved in the telescope as space ships.

A *lot* of space ships.

"Wonder what's happening," Carmen said uneasily as Perez sat at the telescope counting the ships for a third time.

Meredith, in the seat beside her, adjusted the radio to what he hoped was the right frequency. "If I've read Msuya right," he said, "what we're seeing is a UN military attack."

"*What?*" Carmen gasped. "But—"

"The security code," Hafner said abruptly. "The other spies—he's got the code to make new supervisors, doesn't he?" He snapped his fingers. "*That's* why you wanted to take this trip right away, isn't it? To get the lifeboat out of his reach."

"You mean you deliberately left Astra open to that—" Perez began.

Holding up his hand for silence, Meredith mentally crossed his fingers and flipped the "send" switch. "This is Colonel Meredith," he said into the mike. "Please patch me through to Major Barner."

Chapter 34

Secretary-General Saleh was seated alone at the far end of the conference room table when Meredith and Carmen entered. Passing up his usual seat at the table's head, the colonel moved down to sit directly across from their visitor. The usual unspoken conventions of position and relative power could be ignored in such an informal meeting. "Good day, Mr. Saleh," he nodded as Carmen sat down beside him. "May I present Miss Carmen Olivero, head of the Astran Council."

Saleh nodded with tight-lipped courtesy and looked back at Meredith. "Before we go any further, Colonel, I must officially insist that the bodies of the UN commando squad be returned to us."

"You're not in much of a bargaining position, but we have every intention of sending the bodies back. Whether or not the Rooshrike will let you leave the system is, of course, another matter entirely."

"Indeed. Their spokesman informs me that decision is up to you."

"Ah," Meredith nodded. He'd already heard that from Beaeki nul Dies na, but he'd wanted to make sure Saleh knew it, too. "Well, you can't blame them for being touchy. As our supply partners and sort-of sales agents, they have a vested interest in making sure the Spinneret stays in Astran hands. You, on the other hand, are seen as al-

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lies of the Ctencri, for whom they have no special affection."

"You need not spell out all the details," Saleh said coldly. "I'm quite aware Msuya's attempted raid has stirred up a great deal of antagonism toward Earth."

Msuya's raid, Meredith thought. The phrase was as subtle as a public handwashing—and almost certainly proclaimed Msuya's political demise. *Goal one; check.* "All right, then. The races that provide the wonderful gadgets on which your power is based are mad at you. How would you like it if I broke your stranglehold on Earth for good?"

Saleh's face remained impassive. "How would you do that?"

"By opening up direct trade with individual nations, of course. After this fiasco the Ctencri couldn't lift a finger to protect their monopoly with you, and with our cable income we could undercut any price you or they could offer. In no time you'd be back to being the overgrown debating society you were a couple of years ago. I presume you would find that distasteful?"

"Of course—as would you," Saleh said. "Surely you recognize from history that Earth has a better chance for international peace under the sort of economic empire the UN now represents." He waved a hand. "You didn't ask me down here simply to gloat over my impending destruction, Colonel; you're not the sort of man who does. I conclude you wish to make a deal. May we get down to it?"

"Fine. Basically, we want to open up Astra for immediate immigration."

"I see. And the prospective settlers will come predominantly from North America, I expect."

"You expect wrong. We want mostly poor and dispossessed from the Third World countries."

For just a second Saleh's impassive expression cracked with surprise before settling into place again. "The people you speak of are mostly farmers," he pointed out. "What would they do here?"

"Work their butts off, for starters. Don't misunderstand me—I don't want Bangladesh or whoever dumping its street bums and criminals on us. We want people who haven't got much chance where they are but still have the ambition and hope to grab a new opportunity when it presents itself." He leveled a finger at Saleh. "That'll be *your* job: to make sure this offer gets to those people and to provide information to us for screening purposes. Miss Olivero has a file with all the details."

Beside him, Carmen pulled a cassette from her shoulder pouch and handed it over. Saleh hesitated a fraction of a second before taking it. He fingered it for a moment, frowning as if he suspected it might explode. "I . . . appreciate what I believe you're trying to do," he said at last, looking up at Meredith. "But do you think you can truly give vast numbers of people a better life here?"

"No—but most of them won't actually be here for long. Once their education and training are completed they'll be sent out to the neighboring empires to monitor the installation and use of Spinneret cables."

Saleh frowned. "They'll *what?*"

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"Don't look so surprised. One of the major worries we've had all along has been the ease with which the cables can be applied to warfare. I don't want the stuff used that way, and neither do any of the races I've talked to—or at least that's what they say. So okay; from now on each cable is going to be accompanied by a small group of monitors, who'll go with it to the installation site and certify it winds up doing what it was supposed to. Other teams will routinely look at old installations, both to make sure the cable hasn't been moved and to perform long-term studies of strength degredation and such. Sure, there won't be all that much to do for now, but it'll take a while to train the monitors anyway. And we *do* plan to sell *lots* of cables."

Slowly, Saleh nodded. "It may work—for a limited number, at least. Very well; you may count on my complete cooperation in this project." He hesitated. "In fact, you would have had my help even without resorting to threats. It appears your vision for Astra is not so different from mine, after all."

"Glad to hear it." *Goal two; check.* "Then there's just one more thing." Meredith let his gaze harden. "Do you know how your commandos died?"

Saleh grimaced slightly. "I understand they were electrocuted by your Gorgon's Head machines in the Spinner cavern control tower. I don't know how Major Barner managed it."

"Major Barner didn't do a thing. One of the commandos, keying in what he *thought* was the sequence for authorizing new supervisors, actually typed something that translates roughly as 'supervisor in danger.' The rest followed automatically." He paused, but Saleh remained silent. "I'm sure you see what that means, but I'll spell it out anyway. With the best transmission equipment and most elaborate scramblers the Ctencri could provide your spies, we still could not only monitor their communication with Msuya, but could even inject our own information into their data transfers. That first of all means you can't trust *anything* Ermakov and company gave you; and it second of all means you'll be wasting your time if you try this sort of trick again. Clear?"

"Clear." Saleh's voice was calm. "Will the scientists be executed?"

"I'm tempted; but no. Instead, I'll trade them to you for Dr. Loretta Williams's two sons, whom you've got in protective custody somewhere. Dr. Williams is staying with us, and it would be nice if her family could be here with her."

A dozen questions flickered across Saleh's face, but he merely nodded. "They'll be brought here as soon as possible."

"Good. Well, then, I think that wraps things up for now." Meredith rose and extended his hand. "Read Miss Olivero's proposals carefully and contact us with any questions or comments."

Saleh reached across the table to grip Meredith's hand. "I'll do so . . . and whether you believe it or not, Colonel, I look forward to working on this with you." He nodded gravely to Carmen, then turned and opened the outside door. There was a brief gust of icy air, and then he was gone.

"Goal three and game," Meredith muttered, feeling the tension draining

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out of him. If Saleh was even half as sincere as he'd seemed, the whole thing might just work. Taking a deep breath, he looked at Carmen. "Well. I don't know about you, but I still have a mountain of work waiting for me back at Unie. Shall we go?"

Carmen snorted as they headed for the door leading to the rest of Martello Base. "You make it sound like I have nothing to do."

"It's got to be easier than it was before all the campaign rhetoric started cooling down." He glanced at her as he opened the door for them. "You're still troubled about something, aren't you?"

She nodded. "Loretta Williams. How are you so sure she's really on our side now? If it's not a secret, that is."

"No secret—I just never got around to telling all of you on our little excursion. You know how we tapped the spy comm net, don't you?"

"Major Barner said you installed Rooshrike gadgets in the radios that let you receive the signals before they went through the scramblers."

"Right. And since the Orspham could give us copies of the corresponding scrambled conversations, we could break the scrambler code itself, which is why we were able to substitute our own computer sequence at this end when Udani tried to send the supervisor data."

"If you knew they were spies, though, why didn't you arrest them right away?"

"Because we still needed their help to decipher the Spinneret equipment." Meredith smiled. "Besides which, it was handy to have Msuya thinking he knew more about the Spinneret than we did. You see, Ermakov and his gang were editing out crucial bits of information in their reports to us, bits they naturally passed on to Msuya. With the bugs in place we actually got everything, of course, but as far as Msuya knew we shouldn't have had the means even to look for the supervisor-danger code, let alone find it. So it never occurred to him to plan for such a contingency."

Carmen seemed to digest that. "I take it, then, that Loretta's reports to us *were* complete?"

"Better than that, actually. After Dunlop's move she started shaving data going the *other* direction. Msuya never knew the lifeboat's full size, for example, and the location she gave him was down an entirely different tunnel system."

"Odd she never mentioned that."

"Not really. As far as she knew it would be an unprovable and all-too-convenient sounding excuse."

They'd reached the door that looked out over Martello's docks now. Glancing out the small windows as they pulled their coats from the nearby rack, Meredith saw that it was beginning to flurry again. He hoped the major storm the satellites had spotted would miss the area as predicted; the Rooshrike were due to start landing two hundred tons of iron and aluminium early in the morning. Pushing the door open, he squinted against the wind and led the way to the nearest hovercraft.

It wasn't until they were out in the open water that Carmen spoke again. "It won't work, you know. I've run the numbers, and there's no way this cable monitor program can absorb enough people to do any real good. Even with

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the teachers and community setup people we'll need to support the whole thing, we're not going to be able to give genuine jobs to more than a couple hundred thousand people at the most. Even the embassies we'll be setting up everywhere in sight won't absorb that many more." She shook her head tiredly. "There are more than a hundred thousand unemployed beggars in Calcutta alone."

"True," Meredith nodded. "But on the other hand we aren't limited to Astra and Earth anymore, either."

Carmen frowned . . . and, slowly, a look of astonishment spread across her face. "You mean . . . Spinnerhome?"

"Why not? Surely the Spinners' enemies are long gone by now, and it seems unlikely that the basic soil fertility could have been destroyed. Of course, we'll need to check the place out thoroughly first, and we'll have to learn enough about that black hole drive to build bigger ships. But that's one of the reasons I want to concentrate so hard on educating our immigrants. By the time we're ready to open up Spinnerhome, we'll need a cadre of capable people available to spearhead the effort."

"And what if Spinnerhome *is* uninhabitable?" she persisted. "What'll we do then?—start checking the other systems on the lifeboat map until we find something?"

"We could," he nodded. "Or we could search the region around Spinnerhome using our own star drive. Between the two of them we've got access to practically the whole damn galaxy." He shrugged. "And in the meantime we'll have spread mankind out as far as we can and have set up on Astra the first crack at a genuine melting pot that anyone's seen since 1776. On the whole, I think the human race is in better shape now than any time in the past century."

Behind them came the roar of repulsers, and Meredith looked out the hovercraft window as the UN shuttle arched overhead. Going back to Earth . . . and Meredith chuckled.

"What's funny?" Carmen asked.

He shook his head. "I'd almost forgotten . . . but one of my most hopeful goals for the whole Astra project was that it would earn me a brigadier general's star. I guess, instead, I'll have to settle for a few of the real thing." ■

● The effects of gravity have long been known with great accuracy . . . For the most part, however, we know what to expect in the absence of gravity.

William P. Schlichter
National Research Council
May 24, 1979

(Submitted by G. Harry Stine)

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the reference library

By Tom Easton

Five-Twelfths of Heaven, Melissa Scott, Baen Books, $2.95, 352 pp.
Active Measures, Janet Morris and David Drake, Baen Books, $3.95, 384 pp.
Momo, Michael Ende, Doubleday, $14.95, 227 pp.
Game of Empire, Poul Anderson, Baen Books, $3.50, 288 pp.
A Day for Damnation: Volume II of The War Against the Chtorr, David Gerrold, Pocket Books, $3.95, 341 pp.
Cobra, Timothy Zahn, Baen Books, $2.95, 352 pp.
A Darkness Upon the Ice, William R. Forstchen, Ballantine/Del Rey, $2.95, 288 pp.
Adventures, Mike Resnick, Signet, $2.95, ? pp.
Medea: Harlan's World, Harlan Ellison, ed., Bantam, $10.95, 544 pp.
Late Knight Edition, Damon Knight, NESFA Press (Box G, MIT Branch PO, Cambridge, MA 02139–0910), $25 boxed, $13 unboxed, 150 pp.
Science Made Stupid, Tom Weller, Houghton Mifflin, $6.95, 80 pp.
Free Software, Tony Bove, Cheryl Rhodes, and Kelly Smith, Baen Books, $9.95, 309 pp.

Science fiction? It's got starships and star travel. Fantasy? The technology is sheer magic, based on magi and spells, and on an ingeniously antique magic as well, centered on heaven and hell and purgatory and the music of the spheres. The ships have keels that emit sounds that mesh with the notes of planets, stars, and space itself to generate attractions and repulsions. Purgatory is, of course, the transition to heaven. The twelfths of heaven are the depths and speeds of hyperspace FTL travel, and reaching them depends on having the right alloy of mundane and heavenly matter in your ship's keel.

In **Five-Twelfths of Heaven**, Melissa Scott has clearly produced something original. Yet it works only in part. She strikes me as having tried too hard to

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translate the technology of matter into that of spirit, and thus to have produced a jarring anachronism. She has not devised a technology of magic we can accept as working even in its own terms.

The story doesn't quite save the day, either. We begin with poor Silence Leigh, mystic pilot on her grandfather's starship. Grandpa dies on Secasia, and the local probate court, customs, and a villainous uncle and local merchant combine to rob her of her inheritance. She escapes as pilot to a pirate, marries him and his noble engineer, and is captured by the ruling Hegemony. Enslaved with a geas, she musters unheard-of strength to break the binding spell. She frees her mates, and they escape once more, this time with a captive magus. Pursuing lost Earth, they reach only a guardian Rose World (shades of the Rosicrucians!), where Silence must turn into a magus herself to save them all.

Action, chase, and aspiration. It's got all the moves, but Scott seems to have exhausted her originality with the anachronistic magic. And the ending, when Silence metamorphoses, is a gratuitous cop-out. Scott had worked herself into a bind only that could get her out of.

Save your money. Spend it instead on—

That latest in prize books, that latest in sales boosters, that latest in Flemingian brink-hanging—**Active Measures**, by Janet Morris and David Drake.

For your $3.95, you get a pretty good yarn plus an entry blank (photocopies won't do). Fill in the blank with your answers to seven questions based on the information given in the story; the seventh is the tie-breaker, for you have to come as close as possible to the authors' own words filed away in a vault until the deadline of September 30, 1985. Then, all you have to do is send in the blank with the fifty-cent "processing fee," and you have a shot at the $10,000 prize. Good luck!

The story's premise is that the U.S. President is a Soviet agent, he has made his "controller" the deputy chief of the CIA, and American policy has turned to isolationism, unilateral disarmament, and cheap grain sales to the USSR. At the same time, *agents provocateurs* are busily fragmenting the US body politic. Much to the Reds' delight, the US is nearly done as a world power.

But only nearly. In Istanbul, a very junior agent talks briefly to a would-be defector who hints of the secret. Soviet *and* CIA forces then make every effort to waste Larry Fox, but he gets away and brings word back to Stateside friends. And the undercover war of the millennium is on. There are firefights in the streets of Washington, bombs in the suburbs, and an assassination of the man who will turn America's greatest triumph, a working powersat, into a Soviet weapon. The action never lets up as the story rushes to its dazzling finish, and the reader's greatest frustration is that the authors never give him or her a chance to pause long enough to catch those clues so essential to answering the prize questions.

You'll never believe it for a minute—a spy as President? C'mon now! —but you'll have lots of fun. Read it twice or thrice, and you might even win the ten grand.

When Michael Ende's *The Neverending Story* came to these shores from Germany, it brought a world-wide reputation with it. I praised it, so did others, and it did well enough, though I don't know how well.

Now there's **Momo**. First published in 1973, it gained new momentum with

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Story's success. It has been a German best-seller for the past four years and has sold over a million copies there. There are 36 foreign editions, it's an alternate selection for two American book clubs, and Penguin has the paperback rights. It seems well on its way to doing as well as *Story* ever did.

Momo is a satirical commentary on the modern propensity to forfeit leisure to the god of time. The main character is the girl Momo, naif and waif, who lives in a niche in an ancient amphitheater and charms the neighboring villagers with her gift of listening. Anyone can spill their soul in her presence, resolve conflicts, blossom in creativity, for she accepts all, intently and uncritically. She is thus the center of a happy little world, until. . . .

Until the little gray men appear, smoking their eternal gray cigars. They are omnipresent, though no one recognizes them, and they convince all—all except Momo—to save time, depositing it in their Timesaving Bank. The result is hustle, drive, efficiency, familiar things. The result is loss of time for fellow beings, for stories and listening and play. Leisure disappears, for time saved is never there to use, and work expands to fill the time available. All effort must have a productive aim, even children's play. Joy vanishes from the world.

Momo becomes aware of trouble when her friends all disappear. A solution is offered when a turtle named Cassiopeia leads her to Professor Hora, the god who controls the flow of time to mortal hands and who may be death incarnate. The turtle quite blatantly embodies the story's moral—the more haste, the less speed—as does Prof. Hora's abode, but for all that, Ende's fable is a poignant, appealing tale. That it can be such a hit is surely a good sign for the world. We do need more people who are able to give others the gift of time and less who have no time to give.

If *Momo* strikes you as dreamlike, then you sense the mood that makes it a fantasy perhaps more than the little gray men and their cigars. The book fits neatly into the crack between fantasy and mainstream allegory and satire. We can claim it for our own—just as we do *Gulliver's Travels*—but so can everyone else. And that may be one key to its success.

Poul Anderson's **Game of Empire** returns us to the days of the Terran Empire, toward the end of Dominic Flandry's long career of holding off the Long Night. Yet the tale's main character is not Dominic. Instead, Anderson gives us his hero's spirited bastard daughter, Diana Crowfeather Flandry, who has survived alone since her mother's death three years before. She is just seventeen.

Game's world is Imhotep, to which Dominic had once evacuated the Tigeries and vaz-Siravo. The conflict is Admiral Sir Olaf Magnusson, a man of remarkable victories over the Merseians, and his sudden drive toward the Imperial throne.

We meet Diana first when she imposes herself as guide on a visiting Wodenite scholar, Francis Xavier Axor. They are soon joined by an old friend, the Tigery Targovy, an agent of Imperial Intelligence who has just smelled something peculiarly rotten and been ordered off the trail. And off we go. Magnusson declares himself as Emperor and begins his war of rebellion. Diana et al. follow Targovy's nose into an elite enclave and a Merseian plot. And Dominic surfaces to reset the board for another round in the everlasting game.

It's been awhile since I read much Flandry, so I go on my stored impres-

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sions when I say *Game* struck me as fun, but weak. Anderson has done fine work lately, and he surely has more to do. I suspect he wrote *Game* less for its own sake than perhaps for the sake of readers who have asked for more in this particular vein. Most of all, I suspect, he wrote it to set up a new cycle of operatic adventures for Diana. Join me in high hopes for his next.

David Gerrold's **A Day for Damnation** is the second volume of *The War Against the Chtorr*. The first was *A Matter for Men*, which, almost two years ago, I called a very Heinleinian tale and praised with reservations. This one is less Heinleinian, has less scope, and falls at least partially flat. Hero Jim McCarthy, that high school biology student who has become an expert on the invading Chtorrans, giant man-eating caterpillars, and on killing them, remains the center of attention. But that attention is far more narrowly focused. We see virtually nothing of the world-wide context in which the US is struggling to stamp out or control the invasion of the alien ecology. We see little more than McCarthy's constant struggle to get laid and his impossible efforts to believe he is himself *hot stuff*.

I'm facetious. The book does have more to it than that. Gerrold is complicating his invaders, revealing that the Chtorrans have some intelligence and introducing the apparently sentient bunnydogs, who seem able to control the caterpillars. Space Opera is fading here before an insistently environmentalist (ecological) message of interdependence. However, Gerrold has not yet begun to show us how people will fit into the new world he is creating. He hints that a *modus vivendi* will prove possible, but he reserves the details for future volumes.

One of the subthemes in *Damnation* has to do with the difference between identity—all the tags of memory—and self—that which experiences the identity. Gerrold makes the theme explicit when he brings in McCarthy's old buddy, who has become a body-switching telepath. He reinforces it when he bases an attempt at contacting the Chtorran-bunnydog intelligence on submersion of identity, and again when he shows us a human "tribe" whose members have surrendered both their sense of identity and their language. I suspect the card Gerrold is hiding up his sleeve is that when the giant caterpillars eat people, they are *really* trying to communicate!

Wait and see.

Timothy Zahn has taken the basic concept of his *Blackcollar* and developed it further. Now he gives us **Cobra**, two of whose chapters have appeared in *Analog*. The hero, Jonny Moreau, is a youth on a frontier world when he hears of the invasion of the Trofts elsewhere. Promptly enlisting, he qualifies for a new military elite, the Cobras. Soon equipped with reinforced skeleton, servomotors, power pack, lasers in his little fingers, a heel-firing armor-piercing laser, ultrasonic generators, and computerized reflexes, he goes off to war, a superman.

So far, so good. Jonny and his fellow Cobras help win the war. But when they return home, they find they cannot fit in. Everyone is scared spitless of them, for though most of their weapons are gone, their reflexes remain, and they are automatically deadly when attacked. *Cobra* soon becomes more than just another war story, for Jonny and his fellows must find some adaptation to society. The solution is to make them guardians of new colonies (an option

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sadly lacking to Vietnam vets). Jonny moves through that stage to become a politician, and later a statesman, guided all the way by his home-grown sense of ethics. The book thus becomes an admirable study of maturation, and it is well worth reading.

The puff sheet Baen Books sends reviewers assures us *Cobra* is but the first of two books about the Cobras. I must say that Zahn seems to have exhausted the topic already, but I am sure that he has something new up his sleeve. I look forward to seeing what he has in mind.

William R. Forstchen's background as an ancient and medieval historian educated in part by Benedictine monks and fond of iceboating thoroughly informs his trilogy, *Ice Prophet, The Flame Upon the Ice*, and now **A Darkness Upon the Ice**. Set two millennia in the future, long after modern humanity's attempt to launch a starship shattered the Moon and set a ring about the Earth, it concerns what may be the Second Coming.

When the Moon broke apart, many fragments became meteorites. Panicked nations flung their thermonuclear arsenals, and the pall of dust so raised brought on a long winter. People survived, but the world stayed frozen, and Forstchen's sailors voyage the seas on runners. Knowledge vanished, held only by the remnants of the Church, and held tightly, kept secret until the day when the species might be trusted with the potentials of technology once more. Schisms yielded new churches and brotherhoods, and the world was lost in the grip of religious tyranny.

Eventually there was born a prophesied Messiah, Michael Ormson, who led a handful of followers to challenge the churches. His goal was to destroy the power of religion and enable an intellectual and technological renaissance. In his own words, "I am a Messiah against ignorance and its handmaiden, religion, and nothing more."

Does he succeed? After two volumes, one church was gone, a second was in disarray. In the third, we see that second religion regaining power as Michael loses resolve. Another, parent of them all, tries vainly to manipulate destiny with prostitutes and assassins. Still another, long neutral, hopes to sway the balance of power in its own favor. Michael retreats with his enemies in full pursuit, and in the end he must die.

Does he succeed? Yes. Forstchen's message is that the Messiah flubbed it the first time around, when he died in such a way that his followers could build a religion on his bones. Michael Ormson is content to make such a consequence impossible or unlikely, content to fail in such a way that his dreams are left with a momentum of their own, content to make his enemies his de facto disciples. Action, he says, not belief, is what matters.

It's a bloody tale, dense with intrigue and destiny, but it all leads to a philosophically satisfying conclusion—even God can learn, and with luck the world will not be laid waste again.

If the historical flavor makes Forstchen's tales seem like fantasy, remember that there's not a shred of magic there. He hews admirably close to the SF line.

Mike Resnick is a charmingly doggy fellow. He used to raise show collies. Now he and his wife run one of the country's largest "pet motels." And he has obviously learned something from the experience. For proof, he offers us **Adventures**, in which he shows us how vigorously he can chase and rassle and chew that old shoe he found in the yard.

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Mike writes that watching the Ursula Andress *She* put him into hysterics. "Africa," he says, "especially British East Africa, circa 1890–1940, has always been one of my passions, and I found myself saying, in effect: if they could be that funny by accident, what could I do if I tried to be that funny on purpose? That same night I plotted out the book, decided to have my narrator speak in a cross between Trader Horn and Pogo Possum . . . , and I must tell you that I have never enjoyed myself so much as during the months I sat at the typewriter working on *Adventures*. I have this vision of the reader reading a chapter a night and falling asleep with a pleasant smile on his face." He plans two sequels too, one for Asia and one for Europe.

The book is a series of tall tales centering around the exploits of the Right Reverend Lucifer Jones, missionary, scalawag, and con man, whose guiding light is sheer expediency. There is a white goddess, a vampire, ivory-poaching, a mummy caper, a lost race, and the Tabernacle of St. Luke that closes when Jones' preaching converts the madam. There is even a rather caustically portrayed Lord of the Jungle, as well as a number of cinematic in-jokes and historical references I would have missed without the cheat sheet Mike so kindly provided.

The book is thus an impishly disreputable romp, a send-up of classic SF and fantasy and adventure cliches. Is it funny? Yes, though unevenly so. I barely smiled before the third chapter. Thereafter I managed perhaps half a dozen full-throated guffaws and two dozen chuckles and grins. Perhaps a third of the chapters left me flat, but the rest made the whole well worth it.

Humor being what it is, you may very well laugh most at the yarns I found tepid. But you *will* laugh, as long as you have any taste at all for low comedy.

For years, there have been rumors of a publishing E*V*E*N*T. Pieces have appeared here and there, and the word has been that one day, someday, those pieces would become a whole.

Well. Now. Here it is! Edited by Harlan Ellison, labored on by a cast of thousands, it's **Medea: Harlan's World**. Somewhat over half the book is eleven stories by Williamson, Niven, Ellison, Pohl, Clement, Disch, Herbert, Anderson, Wilhelm, Sturgeon, and Silverberg. Each one is set on the world of Medea, designed for Ellison's 1975 UCLA extension course, "Ten Tuesdays Down a Rabbit Hole," on the use of imagination. The designers-by-invitation were Clement, Anderson, Niven, and Pohl, with artistic assitance from Kelly Freas. Then, on April 15, Ellison put Silverberg, Disch, Sturgeon, and Herbert up in front of his class, a thousand strong, to brainstorm the stories that resided in the specs. The audience contributed questions and suggestions. Designers and panelists later kicked in a raft of second thoughts. And then they, along with a couple of guests, wrote stories.

And here you have it all. Ellison gives his reasons for the exercise, displays the specs, and transcribes the panel's brainstorms, the audience contribution, and the afterthoughts. And then the stories, most of them excellent.

Medea is a world of strange geography and biology, of segmented sexes and sentient balloons. It is a world intended to stimulate the imagination, and thereby to show how the imagination works. It succeeds admirably. I find it much, much more satisfying than the *Thieves' World* series or the other shared-world anthologies Ellison credits as

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predecessors. I find it exciting, illuminating, and thoroughly worth buying.

Boskone XXII is past, and I brought home with me a review copy of **Late Knight Edition**, the usual guest-of-honor book, this one honoring Damon Knight by showcasing half a dozen of his stories, including one original, "The Cage," a lovely exercise in the futility of ambition. The others are "La Ronde," "Tarcan of the Hoboes," "I See You," "Definition," and "The Third Little Green Man." Add to this two essays, including Knight's classic "What Is Science Fiction?" and an introduction by Kate Wilhelm, and you have a small gem of a book.

Wilhelm is Knight's spouse and, a gem in her own right, she shared the Boskone goh-ship. She's not in the book except in a small way, for she had her own memorial, a word game called "Pastiche," in which players construct sentences from fantasy words. NESFA had a $5 price tag on the game at the con.

Tom Weller's **Science Made Stupid: How to Discomprehend the World Around Us** is a remarkably dumb book. And that, of course, is its point. It takes a wide variety of basic scientific ideas, in astronomy, physics, and biology, and warps them with the aid of puns, double entendres, and willful disregard of sense. It is occasionally clever, but more often it is only feeble-minded.

Readers with at least a high-school science background will be amused. Those with less will be hopelessly confused. So what else is new?

For you computer users, and especially for those of you on tight budgets, the latest Pournelle Users Guide is **Free Software**, by Tony Bove, Cheryl Rhodes, and Kelly Smith. Its topic is "public domain" software packages, often available from Bulletin Board Systems, other users, and even some companies who add value in the form of documentation. The packages aren't always entirely free, for there can be membership fees, copying fees, voluntary donations, and so on, but when you take this route, you get soaked for a *lot* less.

The book lists available software packages, tells you which ones work best for whom, and describes how to use them. It explains how to use Bulletin Boards and modems, clarifies library files and disc utilities, and demystifies squeezing and unsqueezing. And it seems admirably clear and useful.

I'm not a user myself, but I'm going to hold onto this one. The day will come, I'm sure, when I will want it. ■

● The New Nonsense—really bits and pieces of the old, brought back and given a "now" look by entrepreneurs who know their market—arises when men, having abandoned faith for reason, find the task of living by reason too difficult for them.

Charles Fair

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brass tacks

Dear Stanley Schmidt:

Although I am only 68 years old, I have been reading your magazine since 1930. (How's that for a start?)

I would like to make a couple of comments about *Analog*, and here are my credentials:

I was the youngest editor of any professional science fiction magazine (age 17 in 1933)—the old *Wonder Stories* under Hugo Gernsback. As far as I know I am the last surviving editor of that era.

I know my opinions will sound "dated" (!) because I remember science fiction the way it was at the beginning of the magazines, and frankly, I liked it that way—say from 1929 to 1940—best of all. I am so old-fashioned that I still prefer "Outer Limits" and "Twilight Zone" to "Battlestar Gallactica" and "Space 1999."

The reason I subscribe to *Analog* and no other pub in the field is that I think you have the only real science fiction magazine today. To me, a science fiction story must be unique—that is, if you drop the science fiction theme, you have no story left. I don't consider detective stories laid on Mars or sexual combats on Venus as being science fiction. The sense of "wonder" must be dominant and ever-present, and not challenged by other senses, such as sex. I am all in favor of sex, but not if it is dominating and explicit in science fiction. Each genre to its field!

Of course, I think your stories are tops in the field today, but I would like to see two things changed in *Analog*—maybe because I am a purist. While your editorials are always interesting, they are rarely about science or science fiction, and some of your science articles (all of which are excellent) are far too technical for the average reader and would better appear in a purely science

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magazine. I would prefer to see *Analog* devoted 100% to good science fiction and associated (but not technical) science.

I must admit that I am no longer a very reliable "fan"—that is, I don't try to keep up with the field, and I don't read science fiction unless I think it has literary merit.

Occasionally I appear at conventions as the dodo at the rear of the room. I salute you from the dinosaur generation.

CHARLES D. HORNIG

San Jose, CA

I salute you right back, and I'm delighted to hear from you. The fact that my editorials rarely deal directly with science fiction is deliberate: our readers have made it pretty clear that in general they'd rather read stories than discussions about *stories. But they've also shown a strong interest in the* ideas *those stories explore, and in the editorials I poke around that same territory—which includes not only the traditional "hard" sciences, but the entire range of questions concerning how our species got to be the way it is and what it might become in the future.*

Dear Stan,

"Cajamarca Project" by Charles Harness was very entertaining. However, there were some annoying points regarding concepts in the story.

1. Bacteria are prokaryotic; they do not have chromosomes and therefore do not undergo mitosis as a means of cell division. Most bacteria undergo binary fission as a means of reproduction.

2. The bacterium chosen by the author was a poor choice. Namely, *Escherichia coli* is a facultative anaerobe; it can grow in the absence of oxygen as well as it can in its presence. Moreover, *E. coli* more adapted to the intestinal tract probably could not survive in soil because of many soil species already present. Perhaps an obligate aerobe, some spore-forming *Bacillus sp* would have been better.

3. The chemistry aspects do not jibe. The author portrayed an organism that was able to utilize both nitrogen and oxygen from the air to form ammonium nitrate. Nitrogen in the air represents about 80% by volume and 75.5% by weight while oxygen represents 20% by volume and 24.3% by weight. Air pressure is about 14.7 pounds (lbs) per square inch (psi). Therefore 11.13 lbs psi is nitrogen and 3.57 lbs psi is oxygen. If the overall process of formation of ammonium nitrate is as follows:

$2N_2 + O_2 + 4H_2O = 2NH_4NO_3$

56 32 72 160 = daltons of elements used (sum of atomic weights)

The water comes mainly from the soil. In order to reduce the atmospheric pressure to one-half, 7.35 pounds of oxygen and nitrogen must be drawn into the soil by the bacterium in fixing nitrogen and nitrifying half the ammonium formed. For each 160 daltons of ammonium nitrate formed, 56 come from nitrogen and 32 from oxygen, or 88 daltons from the air. We can calculate how much nitrogen and oxygen were used as follows:

$7.35(56/88) = 4.68$ lbs N_2 used; this leaves $11.13 - 4.68 = 6.45$ lbs psi nitrogen

$7.35(32/88) = 2.67$ lbs O_2 used; this leaves $3.57 - 2.67 = 0.90$ lbs psi oxygen in the remaining air

Therefore after the atmospheric pressure is reduced to half, the oxygen will be reduced to one-fourth. Can any human survive without an oxygen tank, including the highlanders?

If the bacterium could metabolize at the rate sufficient to draw the elements

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from the atmosphere to cause a significant depression, (e.g., a tremendous rate of the air being "sucked" into the few inches of soil), the temperature of the soil would change significantly. Nitrogen fixation is an energy-requiring process whereby a lot of organic matter would have to be oxidized to provide the needed chemical energy. Besides the chemical energy, there would be a by-product of heat that could rise sufficiently to kill soil organisms.

Finally, the several pounds of ammonium nitrate per square foot of soil would also kill organisms, besides polluting run-off water.

In conclusion, a blue-green alga (cyanobacterium) in water over a long period might be plausible for a story geared to real facts. Nonetheless, I enjoyed the story and am glad that you published it.

GENE D. PYNES, PH.D.
Little Rock, AR

Dear Analog:

Thanks for another year of fine stories. I look forward to receiving every issue. Again this year I find the voting to be tough, but in the ballot I outlined my favorites.

Many other stories deserve mention, such as: "Frame of Reference"/Jerry Oltion; "The Dominus Demonstration"/Charles Sheffield; "Floodtide"/Ben Bova; "Friendly Environment"/W. R. Thompson; as well as *all* the Joseph Delaney stories.

There are a few more things that I would like to comment on.

First, *The Peace War*, by Vernor Vinge, was by far the best story you had all year. I know there really isn't any voting on Serial this year, but I think many people who read it will agree with me.

Second, the Special Feature, "The Astounding Investigation: The Manhattan Project's Confrontation with Science Fiction" by Albert I. Berger was an excellent article; very interesting and informative. Since this was a bit before my time, it is interesting to see some of the facts of this situation brought to light.

Third, I think you should start a new category of voting each year in Anlab. The category should be Best Writer. If I were to vote on this, my choice, by far, would be Joseph H. Delaney. Even though he did not finish in the top three votes in any category of mine, he was by far the best consistent writer overall. I thoroughly enjoyed all his stories in Analog this year, including "The Next Logical Step"; "Thus Began The Death of Dreams"; "Chessmen"; "Valentina" (w/Marc Stiegler); "The Shaman," and "Dragon's Tooth." Please keep the stories coming from Mr. Delaney. His imagination and original ideas are always interesting and a delight to read.

And lastly, I respect the fact that you tried something a little different this year, even if it was taking a chance. I'm referring to the Mid-December spoof issue of Kelvin Throop's. I enjoyed many of the stories in this issue, as well as disliking many. However, I think that issues like this in the future will be well received. I like people who challenge me to think differently, even if I don't always agree.

Overall, an excellent year again. Keep the good issues coming, and I will be a long time subscriber.

JAY PEABODY
Carpentersville, IL

Dear Stan,

I have received some interesting feed-

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back from the Venus terraforming article, "Second Planet—Second Earth" in December 1984, with some original ideas.

Mr. Paul Dietz had a promising idea I hadn't thought of: blowing off the excess atmosphere with hydrogen bombs. As he notes, this is (alas!) well understood technology. It's a quick and dirty solution that would obviate having to wait generations, unlike biochemical removal schemes. However, it's not enough just to have the energy; one must also be able to apply it, and coupling the bombs' energy to the atmosphere is likely not to be straightforward. Mr. Dietz suggests burying the bombs, but most of the energy of the explosions would probably be spent in merely heating and vaporizing the surrounding rock rather than expelling the overlying atmosphere. It's analogous to the problem of boiling off the atmosphere, which I did touch on.

Mr. Paul Covington had another interesting idea, a twist on sequestering material out of the atmosphere biologically. He noted that some of the bacterial communities at the midocean rifts already put up with conditions not too different from parts of Venus's atmosphere (i.e., hot, high-pressure, and reducing). Many also metabolize sulfur. Perhaps we could tailor similar sulfur-metabolizing bacteria so that they would combine the C in the CO_2 with S into polymers. (As I noted in the article, there is lots of sulfate on and around the Venusian surface.)

These ideas illustrate, I think, that there are lots of potential ways to terraform Venus. There seems to be a tendency, now and again, to write off Venus as useless. However, if we can envision ways to terraform it now, at our primitive level of technology, it surely will be possible one way or the other eventually!

(I got some less original feedback, too: the fellow who didn't think the article went "far enough" needs to reread it. Carefully. He wanted to simply introduce water and other volatiles by crashing in comets, and I went through some pains to explain why that won't work because of the runaway-greenhouse effect.)

The mechanics of terraforming aside, Mr. Dietz also brought up a couple other points. He suggested Venus as a source of deuterium. Although hydrogen is scarce in the Venusian atmosphere, what *is* there is enriched in deuterium, as I noted in my article. This may prove important, although my hunch is that other sources (e.g., volatile-rich asteroids) will be better because of their absence of a gravity well.

Mr. Dietz's second point touches on just the sort of tradeoffs we'll be making as we move into the Solar System: he suggests that Venus may be more valuable for raw materials than as a terraformed second Earth.

Maybe; this is a judgment call, to be sure, but I think that's putting too many eggs in one basket. As I tried to suggest at the end of the article, it has been demonstrated that a planetary environment can remain stable for timescales of hundreds of millions of years. This has *not* been demonstrated for such things as space colonies or other man-made habitats. By terraforming Venus, we ensure an alternate path for life whatever befalls humanity. In diversification there is survival.

STEVE GILLETT

Look for Steve Gillett's follow-up article on terraforming Venus, "The Postdiluvian World," in an upcoming issue of Analog. ■

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(continued from page 8)

More Than One Way...

larly special about the astronomical circumstances in which we evolved and live. But it might be a good idea to remember from time to time that "mediocrity" implies being somewhere near the middle range of one or more variables—and a range, by definition, also has extremes. *Everybody* can't be mediocre unless everybody's exactly the same. Scientists, and especially science fiction writers, need to bear in mind that in some respects we may *not* be mediocre—and that even if we are, somewhere there are places which are far removed from our standards of "normal." Even if those cases are extremely rare, they may by their very oddity be uniquely interesting. Even if something happens only once in the entire history of a galaxy, it will be profoundly interesting to the guy who's there when it does and he finds his life threatened by it. And even if something almost always happens in a particular way—planets forming by routine protostellar rotation and contraction, for example—that may not be the *only* way. Stars do have near-misses, though not often, and it may be that if it happens in just the right way, planets could result—and a planetary system formed by an atypical process may have atypical properties. Even a confirmed evolutionist, thoroughly convinced that most life arises as a natural continuation of star and planet formation, might grant a creationist neighbor that *some* planets might be populated entirely by lifeforms which were Put There. (Though he might then be expected to inquire who did the putting, and how this type of world can be distinguished from the other.)

Formulating generalities is, of course, one of the principal aims of science. But it's not at all clear that statements like "Planets are a byproduct of stellar evolution" or "Genetic information is transmitted by DNA" have anything like the generality of, say, Maxwell's equations. And if they don't, there ought to be a lot of fun in exploring possible exceptions and alternatives! ■

● A few months back Stephen L. Gillett, Ph.D., had an article here called "Second Planet—Second Earth," about current scientific thinking on the venerable science-fictional subject of terraforming Venus. Our field has done a lot of thinking about how that might be done, but not nearly so much about what the subsequent history of the planet might be after the job was "finished." That's the subject of Dr. Gillett's follow-up article, "The Postdiluvian World," which we feature in our November issue.

Some familiar characters will also return in at least two of our fiction offerings. P. M. Fergusson's "smart blade" Gertrude is back in "The Darkling Plain," and George R. R. Martin's Haviland Tuf returns to some unfinished business in "Second Helpings." Plus, of course, as many other stories as we can squeeze in, quite likely including some by Ben Bova, Eric G. Iverson, and Jayge Carr.

IN TIMES TO COME

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a calendar of analog upcoming events

11-13 October
WINDYCON XII (Chicago SF Conference) at Hyatt Regency, Schaumburg, Ill. Guest of Honor—C.J. Cherryh, Artist Guest of Honor—Todd Hamilton, TM—Algis Budrys. Registration—$15 until 1 October, $20 at door. Info: Windycon, Box 432, Chicago IL 60690.

19-20 October
FALL-CON 1 (SF & Fantasy conference) at University Centre Hotel, Gainesville, Fla. Guest of Honor—Piers Anthony, Comic Artist—Dave Sim. Four non-stop video rooms, games tournament, hucksters, Dr. Who, art show. Registration $8 until 1 September, $10 thereafter ($6/day at the door). Info: Bill Hatfield, Novel Ideas, 1122 West University Avenue, Gainsville FL 32601.

25-27 October
NECRONOMICON 85 (Florida SF conference) at Holiday Inn, Riverview, Fla. Guests of Honor—Robert Bloch and Roger Zelazny, Special Guests—Robert Adams and Andre Norton. Registration—$10 until 1 October, $15 at the door ($6/day). Info: Necronomicon '85, Box 2076, Riverview, FL 33569. Include S.A.S.E.

25-27 October
MILEHICON 17 (Denver area of SF conference) at Sheraton Inn—Lakewood, Denver, Colo. Guest of Honor—Somtow Sucharitkul, Filksinger Guest of Honor —Leslie Fish, TM—Edward Bryant. The usual plus filksinging. Registration—$18 (June), $19 (July), $20 (August), $21 (September), $22 (October); one day memberships $5 (Friday), $10 (Saturday), $10 (Sunday). Info: MileHiCon 17, Box 27074, Denver CO 80227. (303) 934-7659 or (303) 936-4092).

25-27 October
ROVACON 10 (Tidewater area SF conference) at Roanoke Civic Center and Holiday Inn, Roanoke, Virginia. Guest of Honor —Richard Pini, Science Guest of Honor—Harry Stubbs (Hal Clement), TM—Angelique Pettyjohn, Art Workshop— Frank Kelly Freas, Writing workshops—M.A. Foster. Registration —$9.50 (adults), $7.75 (students), $5.00 (children) until 15 September; $12.00 (adults), $7.75 (students), $6.00 (children). Info: RoVaCon 10, Box 117, Salem VA 24153. (703) 389-9400.

26-28 October
I-CON X (Iowa SF conference) at Iowa City, Iowa. Guest of Honor—Joe Haldeman. Registration $12 in advance ($5 supporting). Info: ICON X, Box 525, Iowa City IA 52244.

31 October-3 November
WORLD FANTASY CONVENTION at Doubletree Hotel, Tuscon, Ariz. Guest of Honor—Stephen R. Donaldson, Special Guest—Evangeline Walton, Artist Guest of Honor—Michael Hague, TM—Chelsea Quinn Yarbro. Registration—$40. Info: 1985 World Fantasy Convention, Box 27201, Tempe AZ 85282. (602) 968-5673.

28 August-1 September 1986
CONFEDERATION (44th World Science Fiction Convention) at Atlanta, Georgia. Guest of Honor—Ray Bradbury, Fan Guest of Honor—Terry Carr, TM—Bob Shaw Registration—$25 supporting; $45 until 1 August 1985. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo awards and the John W. Campbell Award for Best New Writer. Info: ConFederation, 2500 North Atlanta #1986, Smyrna GA 30080. (404) 438-3943.

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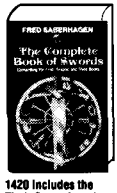

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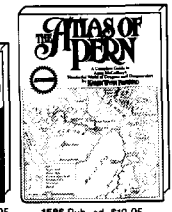

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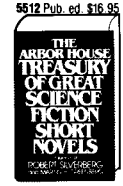

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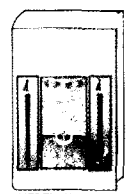
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